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Meconopsis aculeata, Royle.

Frontispiece.

BEAUTIFUL FLOWERS OF KASHMIR

BY

ETHELBERT BLATTER, S.J., Ph.D., F.L.S.

Illustrated by

Mrs. G. A. WATHEN

and

HALDAR JOO WALLI

Volume I.

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TO

F. J. MITCHELL, Esq.

WITHOUT WHOSE ENCOURAGEMENT THIS WORK

COULD NOT HAVE BEEN

WRITTEN

PREFACE.

IF everything had happened according to human plans this volume would have appeared some time ago under the name of my friend Professor F. HALLBERG. He had undertaken several botanical tours into Kashmir. In 1921 he spent the whole spring and summer in the "Happy Valley" and at higher elevations. It was on this occasion that, with the help of Mr. F. J. MITCHELL and Mr. W. S. MILLARD, he was able to engage the services of HALDAR J. WALLI, a student of the Bombay School of Art. About half the illustrations contained in the two volumes are by him. The other half was kindly presented to Professor HALLBERG by Mrs. G. A. WATHEN. She had painted practically all the flowers in the summer of 1919 at Gulmarg. All the specimens, except the Blue Corydalis, were gathered on Aporwat, the mountain above Gulmarg.

Professor HALLBERG was still able to name his specimens and to arrange the illustrations into plates when an untimely death put an end to his enterprise on November 2, 1924. With him Indian Botany has lost a very capable and enthusiastic worker. To be alone in the heart of wildest nature, to tramp untrodden lands, to discover hidden things, to face difficulties and hardships, to live untrammelled by convention was his delight. His breezy, cheerful character, his refinement and accomplishments, his wonderful and varied experiences, his depth and range of knowledge made him a fascinating companion.

When Mr. MITCHELL asked me to undertake the writing of "Beautiful Flowers of Kashmir," I was told that the book should be a popular one. I have, therefore, tried to avoid technical terms as much as possible. Critical discussions of any kind have, for the same reason, been strictly omitted, though the plants collected by my friend and his numerous field-notes would have offered ample material. In the

description of the species I am greatly indebted to Hooker's *Flora of British India.*

This is not a complete Flora of Kashmir. It is a selection of the more common and more beautiful flowers encountered in that country. Many more species are described than figured. Of every genus which is represented by the illustration of at least one species, I have aimed at describing most species which have been noted in Kashmir, thinking that it would not be too difficult to identify the various species, provided the genus was traceable by a drawing. Collett's *Flora Simlensis* and Coventry's *Wild Flowers of Kashmir* form a useful complement to the more popular literature on Kashmir vegetation. Whenever those volumes give an illustration of a plant described in this book a reference to it will be found after the botanical name.

It now remains to express my deep gratitude to all those who have helped me in this work. The staff of the Herbarium, Kew, have devoted considerable time to the naming of specimens, and the Curator of the Herbarium, Royal Botanic Gardens of Sibpur, was always ready to reply to my numerous inquiries. To Mr. W. S. MILLARD I am indebted for the assistance he has given me in preparing the manuscript for the press and in correcting the proofs.

E. B.

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GLOSSARY.

Achene—A dry one-seeded fruit as in the Dandelion, or one carpel in a cluster, as in the fruit of the Buttercup.
Acuminate—When the tip of a leaf is tapering and prolonged to a long point.
Acute—Having a sharp-pointed tip or when the tip forms a narrow angle.
Alternate—When the leaves are arranged one above the other at different levels.
Annual—Plants that flower in the same year in which they are raised from seeds.
Anther—That part of a stamen in which the pollen is produced.
Awn—A stiff or flexible bristle.
Axil—The angle formed by the stem or branch with the attached leaf.
Axillary—When an organ grows from the axil of a leaf.

Berry—A fleshy or pulpy fruit with seeds embedded, e.g., Grape, Gooseberry.
Bi—Used in compounds, means twice or two, e.g., bilobed, i.e., having two lobes.
Blade—The flat part of a leaf.
Bracts—Leaf-like or scale-like organs immediately beneath the flowers. Several bracts arranged in a whorl below an umbel or head of flowers are called involucre.
Bracteoles—Small bracts immediately below or next to the flower.

Calyx—Made up of sepals which are free or united.
Capsule—A dry fruit splitting open when ripe.
Carpel—One of the component parts of a fruit; carpels are separate (Buttercup) or united (Flax); the pod of a Pea consists of one carpel.
Catkin—e.g., the flower-spike of a Willow.
Ciliate—Having hairs on the margin.
Claw—Stalk of a petal.
Compound—When a leaf is divided to the stalk or midrib into several distinct leaflets.
Corolla—Made up of petals which are free or united.
Corymb—When the flower-stalks arise from different points on the axis; the stalks get shorter higher up so that the flowers are at the same level.
Crenate—When a leaf has rounded teeth on the margin.
Cyme—An irregular clustered inflorescence; the cyme of a Forget-me-not is called scorpioid cyme.

Digitate—When the leaflets of a compound leaf arise all from the top of the stalk, spreading like the fingers of a hand.
Drupe—A fleshy fruit enclosing a stone which contains the seed, e.g., the Cherry.

Elliptical—Similar to egg-shaped, but both ends are equal.
Entire—When a leaf has an unbroken margin.
Epiphyte—A plant growing on another but not drawing food from it, e.g., many orchids.

Fascicled—Arranged in a bunch or cluster.
Filament—Stalk of a stamen bearing the anther.
Filiform—Very slender, thread-like.
Follicle—A fruit consisting of one carpel which opens only along the inner suture when ripe (e.g., Larkspur).

Glabrous—Smooth, having no hairs.
Glandular—Furnished with glands, usually at the tip of hairs.

Hermaphrodite—When both sexes are present in the same flower.

Inflorescence—The mode in which the flowers are arranged on the axis.
Involucre—A collection of a sort of leaves round a cluster of flowers (Dandelion), or at some distance below them.

Keeled—When an organ has a ridge like the keel of a boat.

Linear—When a leaf is narrow and has the edges almost parallel, e.g., in Grasses.
Lobe—A division of a simple leaf, or of a leaflet or petal.

Mucronate—When a leaf or petal terminates in a short hard point.

Odd-pinnate—When a leaf is pinnate and has an odd terminal leaflet.
Ovary—That part of the female organs of a flower which contains the ovules or young seeds.

Panicle—When the axis of the inflorescence divides into branches each bearing two or more flowers.
Pappus—The calyx-limb composed of hairs or bristles, e.g., in the seed of the Dandelion.
Perennial—Flowering more than once from the same root.
Persistent—Used usually of the calyx or style when they are still visible in the ripe fruit.
Pinnate—A compound leaf having several leaflets attached to each side of a central rib.
Pinnatifid—When the leaves are cut into lateral segments to about the middle, e.g., the Common Groundsel.
Pubescent—Clothed with short, soft hairs.

Raceme—An inflorescence having a common axis bearing stalked flowers, e.g., the Hyacinth.
Radical—When the leaves grow direct from the root or root-stock e.g., in the Primrose.
Regular—When all the petals or all the sepals are alike.

Salver-shaped—e.g., the corolla of Syringa.
Spike—An inflorescence having the stalkless flowers on a common undivided axis.
Stigma—The viscous topmost part of the style receiving the pollen.
Stipules—Leaflets at the base of the leaf-stalk, having a lateral position.
Style—The mostly slender termination of the ovary bearing the stigma.

Tuber—An underground fleshy stem, e.g., the potato.

Umbel—An inflorescence in which the flower-stalks radiate from one point.
Unisexual—Flowers or plants bearing only male or female organs.

Valvate—Used of sepals and petals when their edges meet without overlapping.

Whorl—When several leaves or organs arise on the same plane from the central axis.
Winged—Stems or branches or seeds provided with a membranous or leafy expansion.

Plate 1.

RANUNCULACEAE. The Buttercup Family.

CLEMATIS, Linn.

I. Sepals spreading from the base.
 1. Leaves pinnately divided.
 a. Filaments devoid of hairs.
 i. Flowers ¾-1 in. diameter — *C. grata.*
 ii. Flowers ⅓-½ in. diameter — *C. gouriana.*
 b. Filaments hairy.
 i. Leaves once or twice pinnate — *C. orientalis.*
 ii. Leaves several times pinnate — *C. graveolens.*
 2. Leaves with 3 leaflets — *C. montana.*

II. Sepals erect with recurved tips.
 1. Sepals ribbed — *C. Buchananiana.*
 2. Sepals not ribbed — *C. connata.*

Fig. 1. Clematis grata, Wall. Coventry pl. I.

A tall, strong, woody, furrowed climber, climbing by means of its leaf-stalks which become twisted round some other plant. Leaves pinnate with an odd leaflet at the tip, opposite; leaflets rarely only 3, very broadly lance-shaped, often heart-shaped at the base, usually lobed, pointed, sharply toothed, hairy on both surfaces. Flowers ¾-1 in. diameter, cream-coloured, fragrant, in panicles at the end of branches or in the axil of the leaves, the panicles are often longer than the leaves. Sepals 4, sometimes 5 or 6, having the colour and shape of petals, hairy outside, spreading horizontally or bent downwards at the base. No petals. Stamens many, filaments devoid of hair. Fruit a head of small dry bodies, called achenes, conspicuous by the persistent styles which grow out into long feathery tails 1-1½ in. in length, which helps in the dispersal of seed.

Resembles the British species, *Clematis vitalba*, Linn., popularly called Traveller's Joy or Old Man's Beard.

Flowers.—August, September.

Locality.—Usually at lower elevations, 3,000-6,000 ft. in open places; Sind Valley and many other places. Harwan, common.

Distribution.—Subtropical and temperate Himalaya, from the Indus to Kumaon, up to 8,000 ft., Afghanistan, tropical Africa, China.

Clematis gouriana, Roxb.

The specific name refers to Gour, the ancient capital of Bengal. The plant is very common amongst the ruins of that place.

A large climber, with a furrowed stem. The young parts are slightly hairy, but later on it becomes smooth. Leaves pinnate or twice pinnate or twice ternate. Leaflets thin, smooth, very broadly lance-shaped, heart-shaped at the base, long-pointed, without teeth or only with a few very distant teeth. Flowers smaller than in *C. grata*, $\frac{1}{3}$-$\frac{1}{2}$ in. diameter, pale yellow or greenish-white, crowded in panicles. Sepals densely hairy, spreading from the base, tip rounded. Filaments of stamens smooth. Achenes egg-shaped, hairy, with long feathery tails.

A variable plant; some have larger leaflets densely hairy on the under surface and less shining above, others the leaflets smooth on both surfaces.

Can be distinguished from *C. grata* by the much smaller flowers and entire leaflets. It resembles *C. vitalba* even more than the previous species.

Flowers.—August, September.

Locality.—Up to 5,000 ft.

Distribution.—Punjab Hills, W. Himalaya, extending to Ceylon, Java and the Philippines.

Fig. 2. Clematis orientalis, Linn.

A large woody climber, branchlets sometimes with soft short hairs. Leaves pinnate or twice pinnate. Leaflets 1-2 in. long, round to very broadly lance-shaped or lance-shaped, toothed or cut or entire. Flowers $1\frac{1}{2}$ in. diameter, yellow or mottled with purple. Sepals 4, covered with long weak hairs outside or on both surfaces, edges tomentose. Filaments of stamens membranous, broad at base, tapering upwards, silky. Achenes oblong, silky-hairy.

This species varies a good deal as regards shape of leaves and size of flowers.



FIGS.—1, *Clematis grata*, Wall.; 2, *Clematis orientalis*, Linn.; 3, *Clematis Buchananiana*, DC.; 4, *Anemone rupicola*, Camb., var. *glabriuscula*, Hook. f. & T.; 5, *Anemone obtusiloba*, Don (blue); 6, *Anemone obtusiloba*, Don (white); 7, *Anemone obtusiloba*, Don (yellow); 8, *Anemone tetrasepala*, Royle.

Flowers.—August, September.
Locality.—Sind Valley; ascending to 14,000 ft.
Distribution.—Temperate Asia, from Persia to Manchuria, W. Himalaya, dry inner valleys from the Indus to Kumaon.

Clematis graveolens, Lindl.

A slender climber, devoid of hairs except the flowers. Leaves cut into numerous compound pinnae. Leaflets ½-1 in. long, toothed or cut more deeply or 3-lobed or cut down to near the base, last segment oblong, pointed or blunt. Flowers forming 3-7-flowered panicles, upper flowers often solitary, 1½-2 in. diameter, pale yellow, with a heavy scent. Sepals hairy outside, densely tomentose inside. Filaments narrow-linear, hairy. Achenes hairy.
The very compound leaf distinguishes this species at once. Resembles the European *C. Flammula.*
Flowers.—August, September.
Locality.—Subtropical regions.
Distribution.—W. temperate Himalaya to Kumaon, 6,000-11,000 ft.

Clematis montana, Ham.

A woody climber, smooth or silky. Stems rounded. Leaves of 3 leaflets, stalked, clustered at the nodes; leaflets narrowly ovate, margins more or less toothed or cut, especially towards the tip. Flowers 2-4 in. diameter, white or pinkish or yellowish, solitary on axillary stalks; flower-stalks longer than the leaves. Sepals 4, elliptic, spreading, pointed or blunt. Filaments narrow-linear; anthers and achenes smooth.
Flowers.—April, May.
Locality.—On steep, open hill-sides in masses, rambling over shrubs. Harwan, near Reservoir. Near road above Rampore, common.
Distribution.—Temperate Himalaya, from the Indus to the Brahmaputra, from 4,000-12,000 ft., Khasia Hills.

Fig. 3. Clematis Buchananiana, DC. Collett, fig. 1.

A large woody climber, hoary or coarsely or shortly hairy. Leaves pinnate, the bases of the opposite stalks more or less united. Leaflets 5-7, 2-3 in., broadly egg-shaped or almost round-heart-shaped, pointed or blunt at tip, coarsely serrate or 3-5-lobed. Flowers pale yellow in long, leafy panicles, 2-3 in. diameter, often sweet-scented. Sepals ¾-1 in. long, erect, tip recurved, pointed, linear-oblong, many-ribbed,

tomentose on both surfaces. Filaments densely hairy. Achenes densely hairy.

Very variable as regards hairiness of stem and leaves.

Flowers.—August, September.

Locality.—Sind and other valleys, common; 5,000-10,000 ft.

Distribution.—Temperate Himalaya, Mishmi.

Clematis connata, DC. Coventry pl. II.

A tall, woody climber with the stems faintly grooved, devoid of hairs except the flowers. Leaves pinnate, the bases of the opposite stalks more or less united and sometimes forming a flat expansion. Leaflets 3-7, 2-4 in. long, egg-shaped, lance-shaped, heart-shaped, sometimes lobed, irregularly toothed, smooth. Flowers yellow-white, about 1 in. long, in many-flowered panicles. Sepals ¾-1 in. long, tomentose on both surfaces, not ribbed, erect, tip sharply bent back, blunt. Filaments hairy throughout. Achenes silky-hairy, with a long feathery style, 1½-2 in. long.

Nearly related to *C. Buchananiana*, but the leaflets are not hairy, and narrower, the flowers are smaller, and the sepals not ribbed.

Flowers.—August, September.

Locality.—Mostly at fairly low elevations, 4,000-7,000 ft., e.g., Ferozepore nala below Gulmarg; between Baramulla and Rampur, and throughout the valley (Coventry).

Distribution.—Temperate Himalaya from the Indus to Sikkim, 4,000-10,000 ft.

ANEMONE, Linn. Wind Flower.

I. Achenes with short styles, embedded in dense wool.
 1. Flowering stem softly silky; flowers showy *A. rupicola.*
 2. Flowering stem not silky; flowers small *A. biflora.*

II. Achenes with a short style, not embedded in wool, cylindric or slightly compressed.
 1. Segments of leaves sessile.
 a. Flowers ¾-2 in. diameter ... *A. obtusiloba.*
 b. Flowers ⅓-½ in. diameter ... *A. Falconeri.*
 2. Segments of leaves shortly stalked *A. rupestris.*

III. Achenes with a short style, not embedded in wool, much compressed, almost winged.
1. Leaves almost hairless, up to 10 in. diameter... *A. tetrasepala.*
2. Leaves very hairy, 1-4 in. diameter.
a. Achenes with an incurved beak *A. narcissiflora.*
b. Achenes with a straight beak *A. polyanthes.*
IV. Achenes with a long feathery style ... *A. albana.*

Anemone rupicola, Camb.

Rootstock long, slender, woody. Flowering stem about 1 ft. high, softly silky. Leaves arising from the rootstock, long-stalked, 3-partite (i.e., cut down almost to the base), sometimes each segment provided with a very short stalk, segments acutely toothed or sharply cut into 3 lobes. Involucral leaves (leaves on the flowering stem) almost sessile, 3-lobed to the middle, lobes toothed and cut. Flowers 1-2, large, showy. Sepals 1-1½ in. long, broadly oval, downy outside, white inside, pinkish or not outside. Fruit a head of sessile dry bodies (achenes) with short styles imbedded in dense wool.

Varies considerably as to incision of leaves and hairiness.

Flowers.—June.

Locality.—Below the Lal Shah ki Alam ridge, 11,000 ft.; Tosh Maidan along top of ridge.

Distribution.—Inner alpine valleys of the Himalaya, from Gores and Kashmir eastwards to Sikkim, 12,000-15,000 ft.

Fig. 4. Anemone rupicola, Camb. var. glabriuscula, Hook. f. & T. Rock Wind Flower.

This is a variety of the previous species and is distinguished by being nearly smooth and having the leaves sharply cut.

Flowers.—June, July.

Locality.—Aporwat, above Gulmarg, rocks on hill-side and beside nalas, 10,000-15,000 ft.

Distribution.—The same as of type.

Anemone biflora, DC.

Rootstock tuberous. Flowering stem 2-8 in. high, leafless, slender, usually quite smooth. Leaves arising from the rootstock, long-stalked, cut almost down to the base into 3 lobes

or consisting of 3 leaflets. Involucral leaves (leaves on the flowering stem) sessile, lobed down to the middle. Flowers 1-3 in., small, when young white inside, bluish outside, dull red when old. Flower-stalks hairy, the lateral ones with a 2-leaved involucre, the end one naked. Achenes with short styles, imbedded in dense wool.

Differs from *A. rupicola* by the smooth flowering stem and small flowers.

Flowers.—Spring.

Locality.—In dry stony places, 4,000-6,000 ft.

Distribution.—Persia to Turkestan and eastwards.

Figs. 5, 6, 7. **Anemone obtusiloba**, D. Don. Coventry pl. III.

Rootstock woody, fibrous, clothed with old leaf-sheaths. Flowering stems 6-12 in., tufted, hairy, sometimes branched. Leaves many, stalked, arising from the rootstock, round or almost round in outline, deeply heart-shaped, 3-parted, 2-3 in. diameter, softly hairy on both surfaces, lobes variously cut and lobed, broad, not stalked. Involucral leaves (at base of flower-stalks) about 1 in. long, 3-lobed, not stalked. Flowers 1-3 on one stem, $\frac{3}{4}$-2 in. diameter, white, the lower portion outside usually tinged with blue-purple or lead colour (fig. 6), often blue or deep blue (fig. 5), or, at higher altitudes, yellow (fig. 7); flower-stalks long, slender. Sepals usually 5, sometimes more, silky outside, petal-like. Petals 0. Stamens many. Fruit a head of many achenes which are tipped by a short style and not imbedded in wool, but coarsely hairy.

Flowers.—April to June.

Locality.—Tanmarg, forest, 7,200-8,700 ft.; Khelanmarg, 10,000 ft.; top of Hayan Pass, 10,000 ft.; Basam Gali up to 12,000 ft.; Tosh Maidan, W. side of ridge; from Tosh Maidan to Damam Sar at 13,000 ft.; Gulmarg and Aporwat, open margs and hill-sides.

All varieties common; the yellow variety is smaller; the blue and white varieties are always succeeded by the yellow one at about 12,000 ft. (Mrs. Wathen).

Distribution.—Temperate and alpine Himalaya, from Kashmir to Sikkim, 9,000-15,000 ft.

Anemone rupestris, Wall.

This species is very nearly related to *A. obtusiloba* and it might be better to include it as a form under that name. The only difference I can find is the fact that the segments of the

leaves are narrower and more cut and shortly stalked. It is a smaller plant, more slender and less hairy. Flowers yellow.

Flowers.—May, June.

Locality.—Only at higher altitudes.

Distribution.—Alpine Himalaya, from Kashmir to Sikkim, up to 15,000 ft.

Anemone Falconeri, Thoms. Falconer's Wind Flower.

A softly hairy plant. Rootstock short, stout, fibrous. Leaves arising from the rootstock many, long-stalked, 3-parted; segments again lobed. Flowering stems 3-6 in. high, bearing 1 flower. Involucral leaves small, oblong, entire or slightly 3-lobed, sessile. Flowers $\frac{1}{3}$-$\frac{1}{2}$ in. diameter, white, with a short stalk. Achenes oblong, angled, silky, tipped by a short style, not imbedded in wool.

Flowers.—May.

Locality.—Tanmarg, forest, 7,800 ft.; Gadsar; Kishtwar; usually in shady woods.

Distribution.—W. temperate Himalaya.

Fig. 8. **Anemone tetrasepala**, Royle. Coventry pl. IV.

Rootstock woody, crown fibrous; buds, leaf-stalks and young leaves woolly. Leaves arising from the rootstock, 3-10 in. diameter, almost hairless, long-stalked, leathery, kidney- or heart-shaped, deeply 5-lobed; segments entire or lobed or deeply serrate. Flowering stem 1-2$\frac{1}{2}$ ft. high, bearing many flowers in umbels (the flower-stalks arising from the same point) from between the large sharply toothed involucral leaves. Sometimes the umbels are compound. Flowers $1\frac{1}{2}$-2 in. diameter, white. Sepals, frequently 5-7, often only 4, petal-like. Petals 0. Stamens many. Fruit a cluster of achenes, which are shortly stalked, flattened, and have a short sharp incurved beak and are not imbedded in wool. In Coventry's plate flowers shown are very mature, and do not show the pink buds.

Flowers.—June to August.

Locality.—Near Shirazia Bagh on jungly slope near top of hill; in forest N. of Hayan Pass, near top and on open slopes in nalas, 8,000 ft.; Basam Gali in Juniper tract above 10,000 ft.; below the Lal Shah ki Alam ridge, 11,000 ft.; Tosh Maidan, W. side of ridge; Aporwat, above Gulmarg, rocky hill-sides above 10,000 ft., sometimes among Juniper scrub and Rhododendrons, common; Khelanmarg, abundant; Kishtwar.

Distribution.—Murree and Kashmir, 7,000-11,000 ft.

Anemone narcissiflora, Linn.

A smaller plant than the previous one, 1½ ft. high, erect. Leaves 1-2 in. diameter, densely clothed with long soft hairs, 3-5-parted; segments deeply cut into linear lobes. Flowers 3-8, in simple umbels, white. Achenes few, almost round with a short incurved beak, much compressed, not imbedded in wool.

Flowers.—June.

Locality.—Temperate and alpine regions throughout Kashmir.

Distribution.—Alps of S. and C. Europe, W. Asia, Caucasus, mountains of C. Asia, Kashmir, N. America.

Anemone polyanthes, D. Don.

Rootstock stout, woody. Leaves arising from the rootstock, long-stalked, densely silky, 2-4 in. diameter, 5-7-lobed, lobes broad and with rounded teeth. Flowering stem 1-2 ft. high, erect. Flowers 1 in. diameter, white, in simple or compound umbels which arise from between the very variable more or less cut involucral leaves. Achenes broadly oval with a sharp, straight beak, not imbedded in wool.

This is very nearly related to *A. narcissiflora*, but it can be distinguished by the less cut leaves, more compound umbel and differently shaped achenes.

Flowers.—June.

Locality.—At altitudes from 10,000-12,000 ft.

Distribution.—Inner Himalaya from Kashmir to Sikkim.

Anemone albana, Stev.

A densely tufted, softly hairy herb. Rootstock thick, woody, clothed with old leaf-sheaths. Leaves divided nearly to the midrib into many lobes arranged like the lobes of a pinnate leaf, lobes again divided in a similar way. Flowering stem 6 in. high, when fruiting double the length. Involucral leaves united at the base. Flowers solitary, nodding, dull red-brown. Sepals erect, silky outside, about as long as the stamens. Petals 0. Achenes with long feathery styles.

Can easily be distinguished from the other species by the long feathery style of the achenes, also by the colour of the flower.

Flowers.—June.

Locality.—Ladakh, 11,500 ft. (Meebold).

Distribution.—W. Himalaya, to above 15,000 ft., N. Asia, from Armenia to Baikal.

Plate 2.

THALICTRUM, Linn. Meadow Rue.

Flowers red	*T. pauciflorum.*
Flowers greenish-white	*T. cultratum.*
Flowers green-purple	*T. elegans.*
Flowers greenish, leaves radical...	*T. alpinum.*
Flowers white, large	*T. pedunculatum.*

Fig. 1. Thalictrum pauciflorum, Royle. Few-flowered Meadow Rue.

A glabrous plant. Stem 1-2 ft. high, branched. Leaves almost sessile, alternate, 2-ternate (viz., from one point of the leaf-stalk 3 branches arise and each branch bears 3 leaflets again arising from one point), uniform in size all up the stem; leaflets 3-4-lobed, stalked, pale beneath, the mid-leaflets with the longest stalks. Flowers small, red, regular, in panicles, which have one or few flowers and are at the ends of long branches. Sepals 3-nerved, egg-shaped, pointed, petal-like, soon falling off. Petals 0. Stamens many. Anthers shortly pointed. Fruit a small head of 3-5 achenes which are short-stalked, 3-nerved on each side with a straight style at the tip.

Flowers.—August.

Locality.—Tosh Maidan, on large boulders near nala, about 10,000 ft.

Distribution.—W. temperate Himalaya; from Kashmir to Kumaon, 7,000-13,000 ft.

Thalictrum cultratum, Wall.

A glabrous branched herb; stem 2-4 ft. high. Leaves large, ternately decompound (3 or more times divided, each time producing 3 branches). Leaflets $\frac{1}{4}$-$\frac{1}{2}$ in. long, thin, smooth or slightly hairy below, 3-lobed. Flowers greenish-white in lax panicles. Sepals 4-5, $\frac{1}{2}$ in. long. Petals 0. Stamens many; anthers with a long point. Fruit a small head of achenes, achenes smooth, short-stalked, 3-ribbed on each side, suture on back straight, style forming the tip of the achene straight or hooked.

Flowers.—August.

Locality.—At altitudes of 8,000-12,000 ft.

Distribution.—Temperate Himalaya, from Kashmir to Sikkim.

Thalictrum elegans, Wall.

Stem 8-12 in. high, leaves decompound, 2-3 in. long, pale green beneath; leaflets small, almost round, scarcely $\frac{1}{6}$ in. long, 3-lobed or 3-parted. Flowers very small, green-purple, on a sparingly branched panicle. Sepals petal-like. No petals. Stamens many, anthers short, pointed. Fruit a head of 6-12 achenes on long stalks, inner suture of achene winged; stigma slightly lateral, bent inwards.

This species can easily be made out by the long-stalked achenes.

Flowers.—August.

Locality.—At altitudes of 10,000-13,000 ft.

Distribution.—Subalpine Himalaya, from Hazara to Sikkim.

Fig. 2. **Thalictrum alpinum,** Linn. Alpine Meadow Rue.

An erect, slender, tufted, smooth herb. Stem 3-6 in. Leaves all arising from the base of the stem, pinnate, rarely twice pinnate; leaflets small, rounded, 3-lobed or almost 3-parted, pale green beneath. Scape (flowering stem) simple, sometimes forked. Flowers greenish, borne on stalks along an undivided axis; pedicels short, bent down in fruit. Anthers up to 15, beaked. Fruit a head of a few small striate, almost sessile or stalked achenes; achenes tipped with the hooked style.

Can be distinguished by the leaves all arising from the base of the stem.

Flowers.—June to August.

Locality.—Below Basam Gali in damp ground; Khur Mount, 13,000 ft., Aporwat, above Gulmarg, open hill-sides, above 11,000 ft.

Distribution.—North alpine and arctic region, alpine W. Himalaya.

Thalictrum pedunculatum, Edgew.

Stem 1-2 ft., weak, sometimes straggling. Leaves 3-10 in. long, long-stalked, several times 3-divided, first and second divisions long-stalked. Leaflets $\frac{1}{2}$-1 in., round or obovate, usually 3-lobed, but also up to 7-lobed. Flowers long-stalked, white. Sepals variable in size, $\frac{1}{4}$-1 in. long, twice as long as the stamens. Petals 0. Anthers very short, blunt. Fruit a head of shortly-stalked achenes; achenes nearly $\frac{1}{2}$ in. long, including the style; ribs prominent.

The large white flowers distinguish this species.



FIGS.—1, *Thalictrum pauciflorum*, Royle; 2, *Thalictrum alpinum*, Linn.; 3, *Callianthemum cashemirianum*, Camb.; 4, *Adonis chrysocyathus*, Hook. f. & T.; 5, *Ranunculus lingua*, Linn.; 6, *Ranunculus pulchellus*, C. A. Mey.; 7, *Ranunculus laetus*, Wall.; 8, *Ranunculus arvensis*, Linn.

Flowers.—May.
Locality.—Gadsar.
Distribution.—W. Himalaya to Kaffiristan, 6,000-9,000 ft.

CALLIANTHEMUM, C. A. Meyer.

Fig. 3. Callianthemum cashemirianum, Camb.

A stemless, densely tufted, smooth perennial; root fibrous. Leaves numerous (no leaves in our fig.), all arising from the roots, much pinnately divided, long-stalked; leaflets round, deeply cut. Flowering stems 2-4 in. high, shorter than the leaves, 1-flowered. Flowers 1-1½ in. diameter, white. Sepals 5, broadly elliptic. Petals 8-12, 3 times as long as the sepals, with a nectariferous pit inside at the base. Fruit a head of many, large, almost globose achenes tipped by the short style.

Flowers.—May, June.

Locality.—Gulmarg and Aporwat, open margs and hill-sides, about 8,000-11,000 ft., common.

Distribution.—Inner ranges of the Himalayas, from Kashmir to Sikkim, 9,000-13,000 ft.

ADONIS, Linn.

1. Flowers golden yellow, 1-2 in. *A. chrysocyathus.*
2. Flowers scarlet or golden, with a dark purple eye, ½ in. *A. aestivalis.*

Fig. 4. Adonis chrysocyathus, Hook. f. & T. Coventry pl. v.

A pretty tufted perennial; rootstock scaly, horizontal. Stems several, leafy, 6-9 in. when flowering and becoming up to 15 in. high when fruiting. Leaves arising from the rootstock, 3-6 in., much divided into narrow linear segments. Flowers golden yellow, 2 in. in diameter and more. Sepals 7-8, petal-like, coloured. Petals 16-24, twice the length of the sepals. Stamens many. Fruit a dense head of many achenes about ⅔ in. diameter.

It can be distinguished by the large golden-yellow flowers and the numerous petals.

Flowers.—May to July.

Locality.—Khelanmarg and Aporwat, open margs and hill-sides, above 10,000 ft.; Tosh Maidan, on margin of forest, 10,000 ft., W. side of ridge, abundant; Basam Gali at higher level in open ground; Khur Mt., 13,000 ft.; along the Pir Panjal Range, plentiful.

Distribution.—W. alpine Himalaya, W. Tibet.

Adonis aestivalis, Linn.

An erect annual herb. Stem 1-2 ft, high, leafy, simple or branched. Leaves alternate, stalkless, pinnately divided into thread-like segments. Flowers scarlet or golden-yellow with a dark purple eye, about ½ in. diameter, solitary at the end of branches. Sepals 5, green or slightly coloured, soon falling off. Petals 5-8, rather larger than sepals. Stamens many. Fruit an egg-shaped or oblong head of many small pitted achenes tipped with the persistent styles. The head becomes longer as the fruit ripens.

Nearly related to the British *A. autumnalis*, Linn. (Pheasant's Eye) but differs in the spreading petals.

Flowers.—April, May.

Locality.—Srinagar, in fields on left bank of Jhelum; Gagribal on the Dal; Dachigam Rakh.

Distribution.—Temperate Europe and Asia, W. Himalaya, from Peshawar to Hazara and Kumaon.

RANUNCULUS, Linn.

A. Flowers yellow.
- I. Radical leaves undivided except sometimes in *R. pulchellus*.
 - 1. Leaves lance-shaped, 4-8 in. long — *R. lingua*.
 - 2. Leaves not lance-shaped.
 - *a.* Flowers ½ in. across ... — *R. pulchellus*.
 - *b.* Flowers ⅔-¾ in. across ... — *R. lobatus*.
- II. Leaves lobed or much divided. Achenes inflated.
 - 1. Sepals not hairy, bent back ... — *R. hyperboreus*.
 - 2. Sepals hairy.
 - *a.* Leaves 5-9 lobed — *R. affinis*.
 - *b.* Leaves 3-parted.
 - i. Stem and leaves hairy — *R. hirtellus*.
 - ii. Stem and leaves not hairy — *R. sceleratus*.
- III. Leaves deeply divided. Achenes flattened.
 - 1. Stem erect, without runners. Achenes not dotted ... — *R. laetus*.
 - 2. Stem decumbent. Achenes minutely dotted ... — *R. diffusus*.
- IV. Leaves wedge-shaped, not lobed or trifid. Achenes spinous or tubercled.
 - 1. Achenes spinous — *R. arvensis*.
 - 2. Achenes tubercled, rarely smooth — *R. muricatus*.

V. Leaves trifid or pinnately divided. Achenes gibbous at the sides *R. falcatus.*

B. Flowers white *R. aquatilis.*

Fig. 5. Ranunculus lingua, Linn. Great Spearwort, Spear Crowfoot, Sparrow Weed.

A tall erect smooth plant; rootstock creeping. Stem 2-4 ft. high, hollow. Aerial leaves 4-8 in. long, lance-shaped, half-stem-clasping, attached about the middle of the stem, entire or with a few teeth, with parallel veins. The lower leaves which are sometimes submerged are tongue-shaped (hence the specific name lingua) or heart-shaped, blunt, 3 in. broad, 8-9 in. long. Flowers large, 1-2 in. diameter, yellow, in a sort of panicle. Sepals 5. Petals 5. Stamens many. Fruit a head of broad flat pitted achenes with a sword-like beak.

This is a water-plant or at least a moisture-loving species. It lives in the middle of ponds or lakes, half-submerged, and occurs also in swamps and ditches. Usually it grows some distance from the margin.

Flowers.—May, June.

Locality.—Between Srinagar and Gulmarg in ditches along road; Shaliman Bagh in swampy ground along the canal; Anchar Lake; Dal Lake.

Distribution.—Warm temperate zone, temperate Europe, N. and W. Asia as far as the Himalayas.

Fig. 6. Ranunculus pulchellus, C. A. Mey.

An erect, smooth or hairy or silky herb. Stem 3-12 in. high, simple or with a few 1-flowered branches. Leaves elliptic, oblong, entire, or 3-7-toothed or -lobed, smooth or slightly hairy; the leaves on the stem are lance-shaped, often entire. Flowers ½ in. diameter, yellow. Sepals elliptic, often black-tipped. Petals 5, very broad. Stamens many. Fruit an oblong head of small inflated smooth achenes, style nearly straight.

This is a very variable plant with regard to incisions of the leaf and hairiness of the various parts.

Flowers.—July.

Locality.—Zoji La.

Distribution.—W. alpine Himalaya, Afghanistan, Kashmir to Sikkim, Siberia, Mongolia.

Ranunculus lobatus, Jacq.

A weak decumbent smooth herb. Stems 2-3 in. high. The leaves which arise from the base of the stem ½-1 in. diameter, fleshy, long-stalked, rounded or heart-shaped at the base; the leaves on the stem similar but with shorter stalks and often 3-toothed. Flowers ⅔-¾ in. diameter, yellow. Sepals oval. Petals 5. Fruit an oval head of slightly compressed achenes which are beaked by the long straight style.

Can be distinguished from *R. pulchellus* by the decumbent (not erect) stem, the large fleshy stem-leaves and large flowers.

Locality.—Zaskar.

Distribution.—Inner ranges of the alpine Himalaya, from Zaskar to Sikkim, 12,000-16,000 ft.

Ranunculus hyperboreus, Rottb.

A small smooth perennial, terrestrial or floating. Stem creeping, producing runners. Leaves round or kidney-shaped, 3-7-lobed to the middle or base, or with many capillary lobes. Flowers small, solitary, yellow. Sepals bent back. Petals slightly longer than or as long as the sepals. Fruit a dense head of very small, oval, inflated achenes which are beaked by the short style.

Very variable regarding division of leaves. Several varieties have been made, but it would be better, in my opinion, to consider them as so many forms.

Flowers.—June.

Locality.—Below the Lal Shah ki Alam, creeping on moist mossy stones in streams, 10,200 ft.; Khur Mt., 13,000 ft. in shelter of stones; Ladakh.

Distribution.—Arctic and alpine Northern regions, inner regions of the alpine Himalaya from Kashmir to Sikkim, 14,000-17,000 ft.

Ranunculus affinis, Br.

An erect, diffuse, hairy plant. Stem 6-12 in., often many, arising from a perennial slender branched rootstock. Radical leaves (arising from the base of the stem) kidney-shaped, ½-1 in. diameter, 5-9-lobed to the middle or base; lobes oblong or linear; lower stem-leaves with narrower segments, upper stem-leaves entire or 3-5-parted. Flowers ⅓-⅔ in. diameter, yellow. Sepals silky. Fruit an oblong head of small inflated, scarcely compressed, straight-beaked achenes.

Locality.—Baltistan.

Distribution.—Temperate and arctic Asia and America, inner ranges of the temperate and alpine Himalaya from Kashmir to Sikkim, 11,000-16,000 ft.

Ranunculus hirtellus, Royle.

An erect or decumbent slightly hairy plant. Stem 6-18 in., often tufted, branched, many-flowered, except in alpine forms. Radical leaves (arising from base of stem) 1½-2 in. diameter, long-stalked, heart-shaped, deeply 3-lobed, segments coarsely-toothed, often lobed. Stem-leaves 3-5-parted, segments narrow, entire or toothed near the tip. Flowers bright yellow, ½ in. diameter. Sepals with appressed hairs. Fruit a globose head of many inflated achenes with the straight or hooked style at the tip.

Resembles the European Goldilocks Crowfoot (*R. auricomus*), but the achenes are smaller and less compressed, and the radical leaves, as far as we know, are never entire.

Flowers.—May to July.

Locality.—Tanmarg, in forest, 7,200-8,700 ft.; Gulmarg, 8,000-8,700 ft.; towards top of Hayan Pass, above 9,000 ft., on grassy ground; Khur Mt., 13,300 ft., not common.

Distribution.—Temperate and subalpine W. Himalaya, ascending up to 14,000 ft.

Ranunculus sceleratus, Linn. Celery-leaved Crowfoot or Buttercup.

An erect, smooth, perennial herb. Stem 1-3 ft., often stout, fleshy and branched, hollow, rarely slightly hairy above. Radical leaves 3-lobed or -parted, ½-1¾ in. across, long-stalked, segments lobed, toothed near the top. Stem-leaves short-stalked, 3-parted, segments narrow, lobed and toothed. Flowers ¼-in. diameter, many, pale yellow. Sepals hairy, bent back. Petals oblong. Fruit an oblong head of many inflated, not margined, smooth, blunt or sharp-pointed, wrinkled achenes. The heads finally become cylindrical and longer.

Flowers—May.

Locality.—Between Srinagar and Gulmarg in ditches along road; in a marsh above Drogjun.

Distribution.—Northern temperate zone, Punjab and Bengal plains, valleys of the Himalaya up to 5,000 ft.

Fig. 7. Ranunculus laetus, Wall.

An erect perennial, covered with long, closely-appressed hairs. Stem 1-2 ft., without runners, usually much branched, many-flowered, hairs white. Radical leaves 2-4 in. and more across, long-stalked, deeply 3-lobed; segments deeply cut, nearly equal in length; stem-leaves similar, smaller, stalkless. Flowers 1 in. diameter, long-stalked, bright yellow. Fruit a globose head of many smooth, flattened, not dotted achenes, margins of achenes thickened, style straight.

Closely allied to the European *R. acris* (Bitter Crowfoot or Common Buttercup).

Flowers.—May.

Locality.—Srinagar; Zervan, abundant in meadows.

Distribution.—Afghanistan, temperate Himalaya and W. Tibet, inner ranges of Sikkim.

Ranunculus diffusus, DC.

A decumbent, hairy, perennial herb; nodes sometimes rooting. Stem 6-12 in., producing runners from between the radical leaves. Radical leaves 2-3 in. diameter, long-stalked, heart-shaped, deeply 3-lobed; segments lobed, sharply toothed, mid-lobe the longest. Stem-leaves similar, but smaller and short-stalked. Flowers ½-1 in. diameter, long-stalked, bright yellow. Sepals hairy. Fruit a globose head of smooth, flattened, minutely dotted achenes, style short, straight or hooked.

Resembles the Creeping Crowfoot or Buttercup (*R. repens*, Linn.) of the British flora.

Locality.—On the Chenab.

Distribution.—Temperate Himalaya from Kashmir to Bhutan, 6,000-10,000 ft., Western Peninsula, Sumatra, Java.

Fig. 8. Ranunculus arvensis, Linn. Field Crowfoot, Corn Buttercup, Hedgehog, Urchin Crowfoot, Crows'-claws, Devil-on-both-sides, Devil's-claws, Devil's Coach-wheel, Devil's Currycomb, Gye, Hellweed, Hungerweed, Pricklebacks, &c.

An erect, much-branched, smooth, pale green annual, sometimes hairy above. Stem 6-24 in. Radical leaves 1-3 in. long, stalked, spoon- or wedge-shaped, 3-5-toothed at the tip, otherwise entire. Stem-leaves short-stalked, deeply divided into 2 or 3 narrow segments. Flowers ½ in. diameter, pale-yellow. Sepals appressed to the petals and half as long. Fruit a globose head of 5-10 flattened prickly achenes, style straight or hooked.

Flowers.—March to April.

Locality.—Srinagar, in fields on left bank of Jhelum; Saida Kadala, in wheat-fields; Gagribal. This is distinctly a sand-plant, growing on sandy loam derived from sandy formations.

Distribution.—Europe, N. Africa, temperate Asia, W. Himalaya from Kashmir to Kumaon, Mt. Abu, W. Siberia.

Ranunculus muricatus, Linn.

An erect or diffuse, smooth, rarely hairy annual. Stem 4-12 in. Radical leaves 1-2 in. diameter, 3-lobed, lobes irregularly cut, rounded or heart-shaped at base; upper leaves wedge-shaped. Flowers $\frac{1}{3}$-$\frac{1}{2}$ in. diameter, yellow, solitary and opposite the leaf, or at the end of branches and in panicles. Sepals bent back, rather shorter than the petals. Fruit a large globose $\frac{1}{3}$ in. long head of oval, flattened, tubercled or spinous, rarely smooth achenes; beak straight, flattened, ribbed, tip hooked.

Flowers.—May.

Locality.—Srinagar, in field on left bank of Jhelum; usually in swampy places at low elevations.

Distribution.—Europe, W. Asia, Punjab Himalaya and Punjab, N. America.

Ranunculus falcatus, Linn.

A smooth or slightly woolly, annual herb. Leaves all radical, 3-lobed or pinnately divided, segments narrow, entire or 3-lobed. Flowering stems 1 or more, 1-3 in. high, 1-flowered, longer than the leaves. Flowers small, yellow. Stamens 5-15. Achenes gibbous at the sides, with a long beak which is straight or curved.

Flowers.—May.

Locality.—Pompur village; Kishtwar; usually in dry grassy places.

Distribution.—S. E. Europe, W. Asia, Punjab, Kashmir.

Ranunculus aquatilis, Linn., var. trichophyllus, Hook. f. & T. Water Crowfoot.

Leaves all submerged, segments thread-like. Flowers short-stalked, usually small, white. Stamens few. Fruit a globular head of transversely wrinkled achenes.

Floating leaves never occur in the Indian plant.

Flowers.—April, May.

Locality.—Nasim Bagh; between Srinagar and Gulmarg, in ditches along road; Tanmarg, in water-holes; Gagribal, on the Dal.

Distribution.—Temperate N. and S. hemispheres, Afghanistan, Baluchistan, Indus to Kumaon, Plains of Punjab, E. and W. Tibet.

Plate 3

CALTHA, Linn.

Fig. 1. Caltha palustris, Linn., var. alba, Hook. f. & T. The White Marsh Marigold. Coventry pl. VI.

A robust aquatic. Rootstock stout, creeping, densely fibrous. Stem 6 in. to 2 ft. high, branched and leafy. Radical leaves (arising from the base of the stem) long-stalked, kidney-shaped, smooth, 2-6 in. diameter, entire or finely or coarsely toothed; stem-leaves sessile. Flowers 1-2 in. diameter, at the end of the branches, white. Sepals 5 or 6, petal-like. Petals 0. Stamens many. Fruit a head of narrow, flattened follicles (a little bag which when ripe splits open down one side only), see fig.

This is a white variety of our yellow Marsh Marigold at home.

Flowers.—May to July.

Locality.—Tanmarg, 7,100 ft., in forest, 7,200-8,700 ft.; Gulmarg, 8,600-8,700 ft.; Gulmarg and surrounding hills, 8,000-10,000 ft., common; Gangabal, usually in streams and marshy ground.

Distribution,—Temperate Europe, Asia, W. temperate Himalaya, from Kashmir to Nepal, N. America.

Fig. 2. Anemone sp.

Prof. Hallberg, who found the original of this painting at Mitsahoi, in Kashmir, considers it to be a new species of Anemone. His premature death prevented him from describing it, and I have not seen the plant.

TROLLIUS, Linn.

Fig. 3. Trollius acaulis, Lindl. Coventry pl. VII.

Stem unbranched, leafy above the middle, 3-6 in. when flowering, 12 or more in fruit, the base clothed with brown fibres. Leaves appearing with or after the flowers; radical leaves long-stalked, deeply cut into 5 lobes, lobes again incised; stem-leaves 1-3, similar to the radical leaves, base of stalks sheathing. Flowers 2 in. diameter, solitary, at the end of the stem, golden-yellow. Sepals 5-8, spreading, petal-like. Petals 12-16, very small, shorter than the stamens. Stamens very many. Fruit consisting of several follicles about 1 in. long, style persistent.



FIGS.—1, *Caltha palustris*, Linn., var. *alba*, Hook. f. & T.; 2, *Anemone sp.*; 3, *Trollius acaulis*, Lindl.; 4, *Paraquilegia caespitosa*, Drum. & Hutch.; 5, *Actæa spicata*, Linn.

Looks quite different from the British species *T. europaeus*, called Globe-flower. In this the flower is globose, whilst *T. acaulis* has spreading sepals.

Flowers.—June, July.

Locality.—Basam Gali, sparingly near top of Pass; Gangabal; Aporwat, above Gulmarg, open hill-sides by receding snow and beside nalas, 10,000 ft., common; also at higher elevations, 11,000-13,000 ft.

Distribution.—W. alpine Himalaya, from Kashmir to Kumaon.

PARAQUILEGIA, Drum. & Hutch.

1. Leaves minutely hairy; flowers much smaller than in the next species ... *P. caespitosa.*
2. Leaves smooth; flowers $\frac{4}{5}$-$1\frac{1}{4}$ in. diameter *P. grandiflora.*

Fig. 4. Paraquilegia caespitosa, Drum. & Hutch.

Stems tufted, rigid, $1\frac{1}{2}$-2 in. high; root vertical; neck densely covered with old leaves. Leaves twice ternate; segments round, lobed. Scapes (flowering stems) 1-flowered. naked, or with 2 bracteoles (small leaflets). Flowers usually hanging. Sepals egg-shaped, lilac. Petals hooded, oblong, bifid at tip. Styles rolled inwards. Ovaries warty.

Flowers—July, August.

Locality.—Aporwat, above Gulmarg, crevices in cliffs, about 13,000 ft., common, but not abundant; near Daranshi Camp; Deosir; Baltistan; Saskatti Pass.

Distribution.—Persia, 11,000 ft.; Afghanistan, Turkestan, Kashmir.

Paraquilegia grandiflora, Drum. & Hutch.

Stems densely tufted; rootstock stout, clothed with rigid bristles. Leaves all arising from the base, long-stalked, 2-4 times divided in threes; stalk with ear-like lobes at the sheathing base; leaflets small, 2-3-lobed. Flowering stems 3-4 in. high, 1-flowered. Flowers 1-$1\frac{1}{4}$ in. diameter. Sepals white, tinged with blue or purple outside. Petals small, dark yellow. Stamens yellow. Carpels 3-7, purplish-green.

Flowers.—June, July.

Locality.—Below Lal Shah ki Alam, 11,000 ft.; Khur Mt., 13,600 ft. on rockwalls, growing in large tufts; Tosh Maidan.

Distribution.—Central Asia, China, Kashmir, Kumaon, Garhwal, Kurum, Hazara.

ACTAEA, Linn.

Fig. 5. Actaea spicata, Linn. Baneberry. Coventry pl. VIII.

An erect perennial herb, more or less hairy. Stem 2-3 ft. high, usually branched. Leaves about 1 ft., alternate, divided twice or oftener into 3 parts (ternately compound), leaflets pointed, often lobed, deeply and sharply toothed. Flowers regular, scarcely ¼ in. diameter, white, crowded in short, terminal racemes which become longer in fruit. Sepals 4, petal-like, concave, falling early. Petals 4, shorter than the sepals. Stamens many, longer than the sepals; anthers small. Fruit a black, ellipsoid, smooth berry, about ½ in. long, containing about 10 seeds.

Flowers.—May to July.

Locality.—Tanmarg, forest, 7,200-8,700 ft.; in forest north of Hayan Pass, 8,500 ft.; Gulmarg, fir forests and amongst low growing shrubs on hill-side, above 7,000 ft. common. The habitat of this plant is woods, mountainous pastures, hilly limestone tracts.

Distribution.—Europe, N. Asia, temperate Himalaya from Hazara to Bhutan, N. America.

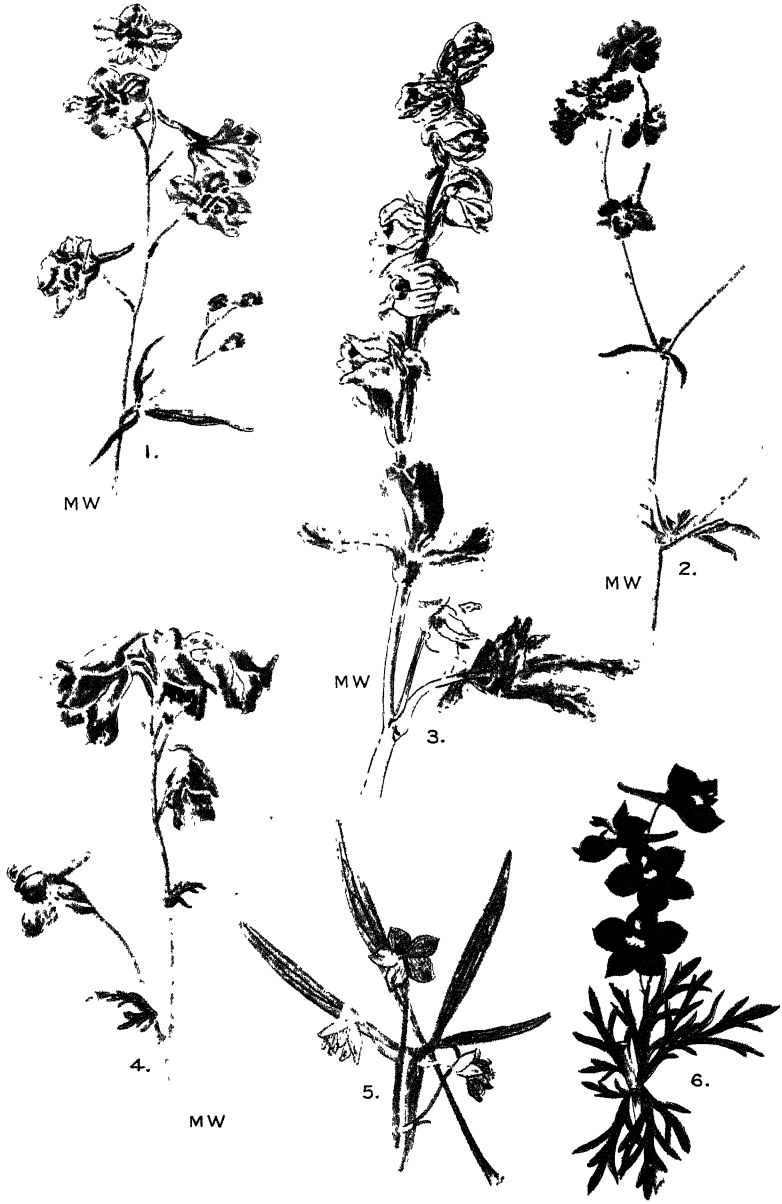
Plate 4

DELPHINIUM, Linn. Larkspur.

I. Spur cylindric or inflated (not awl-shaped or conical)	*D. incanum.*
II. Spur inflated, conical.	
1. Flowers arising along the axis, flower-stalks more or less of the same length	*D. vestitum.*
2. Flower-stalks arising at different points of the axis, but lower flowers with longer stalks so that the flowers are at the same level	*D. cashmirianum.*
III. Spur awl-shaped.	
1. Radical leaves divided to the base or almost so, 5-9-parted ...	*D. denudatum.*
2. Radical leaves divided to the middle or base, 5-7-lobed or parted	*D. elatum.*

Fig. 1. Delphinium incanum, Royle, var.

This is a variety of *D. incanum* described under fig. 2 (see next species). The flowers are purple.



FIGS.—1, *Delphinium incanum*, Royle, var.; 2, *Delphinium incanum*, Royle; 3, *Delphinium vestitum*, Wall.; 4, *Delphinium cashmirianum*, Royle; 5, *Delphinium denudatum*, Wall.; 6, *Delphinium sp.*

Flowers.—July to September.
Locality.—Below Gulmarg, on open rough ground.

Fig. 2. Delphinium incanum, Royle.

Stems 2-4 ft. high, simple below, leafy, hoary all over. Radical leaves 2 in. diameter, 3-parted, soon withering; segments pinnately cut, lobes linear or cut; stem-leaves almost stalkless. Flowers large, 1¼ in. long, bright blue, sometimes mauve; flower-stalks about 1 in. long. Sepals 5, slightly hairy outside, shorter than the spur; spur cylindric, almost straight. Fruit consisting of 3 slightly hairy follicles (small bags formed from one carpel and splitting open down one side when ripe).

Flowers.—August.
Locality.—Ferozepore Nalá, below Gulmarg, fairly dry ground in nalas and round cultivated fields, 6,500-8,000 ft., common; Dachigam.
Distribution.—W. temperate Himalaya, from Gores and Kashmir to Kunawar.

Fig. 3. Delphinium vestitum, Wall.

A very hairy plant, 1½-3 ft. high, usually simple, hairs spreading or reflexed. Radical leaves round in outline, 6-12 in. diameter, long-stalked, deeply 5-7-lobed, segments lobed, sharply toothed at the ends. Stem-leaves similar but smaller. Flower-bearing axis often 1 ft. long, simple or little branched below. Flowers many, crowded, 1-1¼ in. long, blue or purplish. Sepals erect, tips converging. Spur inflated, conical, curved, as long or longer than the sepals. Lateral petals entire. Fruit of 3 follicles opening down one side when ripe.

Flowers.—August.
Locality.—Aporwat, above Gulmarg, damp stony hill-side, above 10,500 ft., local, never in great abundance.
Distribution.—W. and C. temperate Himalaya, 8,000-12,000 ft.

Fig. 4. Delphinium cashmirianum, Royle.

Stem 1-1½ ft. high, smooth or hairy. Radical leaves 2-4 in. diameter, palmately 5-7-lobed, segments 3-lobed and cut; stem-leaves 3-5-parted. Flowers large, purplish, forming lax corymbs, i.e., the flower stalks arise from different points of the axis and rise to the same level, so that the flowers are at the same level. Sepals 1 in. long or more, hairy, as long or longer than the conical inflated spur.

Can be distinguished from *D. vestitum* by the larger flowers

and arrangement of flowers on the axis. (Compare figs. 3 and 4 of Plate 4).

Flowers.—August.

Locality.—Aporwat, above Gulmarg, damp stony and rocky hill-side, above 11,000 ft., common.

Distribution.—W. Himalaya, from Kashmir to Kumaon, 11,000-16,000 ft.

Fig. 5. Delphinium denudatum, Wall. Collett, fig. 4.

Stem 2-3 ft. long, smooth or downy above. Radical leaves 2-6 in. across, round in outline, long-stalked, divided nearly to the base into 5-9 narrow segments which are pinnately lobed, often toothed. Stem leaves few, shortly stalked, the upper ones more or less deeply, 3-lobed, lobes narrow, mostly with an entire margin. Flowers few, scattered, 1-1½ in. long, varying from deep blue to faded grey. Sepals spreading, hairy outside. Lateral petals hairy on both surfaces, 2-lobed, blue.

Flowers.—June.

Locality.—In grassy places at Dachigam Rakh; Takht.

Distribution.—W. temperate Himalaya from Kashmir to Kumaon, 8,000-12,000 ft.

Delphinium elatum, Linn.

Stem 2-4 ft. high, little branched, hairy or smooth. Leaves 4-6 in. diameter, rounded or kidney-shaped in outline, pale beneath, 5-7-lobed or parted to the base; segments wedge-shaped-oblong, 3-lobed or variously cut. Flowers pale blue or purplish, hairy outside, on much branched racemes; flower-stalks 1-3 in. Sepals 5, blunt. Spur as long as the sepals, awl-shaped. Fruit of 3 follicles which open down one side when ripe.

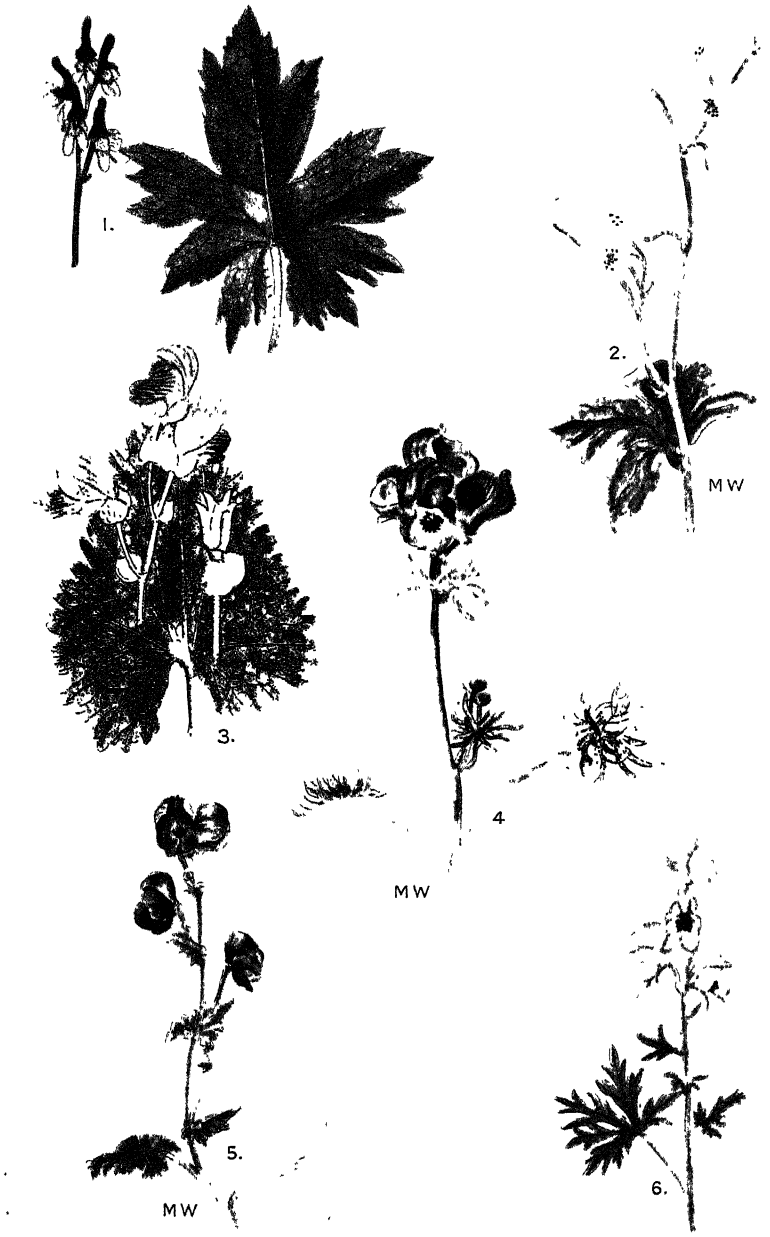
Flowers.—June.

Locality.—Tosh Maidan.

Distribution.—W. temperate Himalaya from Kashmir to Kumaon, 10,000-12,000 ft.

Fig. 6. Delphinium sp.

Professor Hallberg found this Larkspur at Dachigam in the month of June. He himself was not sure about the species, and I have no means of placing the plant from the illustration alone.



FIGS.—1, *Aconitum lycoctonum*, Linn.; 2, *Aconitum lycoctonum*, Linn.; 3, *Aconitum heterophyllum*, Wall.; 4, *Aconitum napellus*, Linn., var. *multifidum*, Hook. f. & T.; 5, *Aconitum napellus*, Linn., var. *rotundifolium*, Hook. f. & T.; 6, *Aconitum violaceum*, Jacq.

Plate 5

ACONITUM, Linn.

I. Upper leaves shortly stalked or nearly sessile.
 1. Carpels 3 *A. lycoctonum.*
 2. Carpels 5 *A. violaceum.*

II. Upper leaves sessile.
 1. Flowers more than 1 in. long *A. heterophyllum.*
 2. Flowers ¾-1 in. long.
 a. Leaves many-lobed to the base } *A. napellus* var. *multifidum.*
 b. Leaves not divided to the base } *A. napellus* var. *rotundifolium.*

Figs. 1 and 2. Aconitum lycoctonum, Linn.

Stem erect, much branched, 3-6 ft. high, smooth or slightly hairy. Leaves round in outline, 6-10 in. diameter, deeply 5-9-lobed nearly to the base, segments lobed and sharply toothed, lower leaves long-stalked, upper quite or nearly stalkless. Flowers 1 in. long, pale yellow or dull purple, variable in size. Flower-bearing axis branched, hairy. Sepals 5, petal-like, free, erect, the upper one helmet-shaped (called helmet), pointed in front and produced upwards in a high blunt peak. Lateral sepals much shorter than the helmet. Stamens many. Fruit of 3 spreading follicles which open down one side when ripe.

Flowers.—July to September.

Locality.—Basam Gali, on wooded slopes; Mekhowali, in forest clearings, 9,000 ft., abundant; woods round Gulmarg above 8,000 ft.; Tosh Maidan.

Distribution.—W. temperate Himalaya, from Kashmir to Kumaon, 7,000-10,000 ft.; Europe, N. Asia.

Fig. 3. Aconitum heterophyllum, Wall.

A smooth plant, or the upper parts downy. Stem 1-3 ft., leafy, simple or branched from the base. Lower leaves stalked, round or broadly egg-shaped, heart-shaped at base, more or less 5-lobed and toothed, upper leaves stem-clasping, lance-shaped, sharply toothed. Flowers more than 1 in. long, dull green-purple or dull green-blue with darker purple veins. Sepals 5, petal-like, erect, the upper one (helmet) pointed in front, top rounded. Lateral sepals as long as the helmet. Fruit of 5 downy follicles.

Flowers.—July.

Locality.—Sonamarg.

Distribution.—W. temperate Himalaya from Hazara to Kumaon, 8,000-13,000 ft.

Fig. 4. Aconitum napellus, Linn., var. **multifidum**, Hook. f. & T. Monkshood Aconite, Monkshood, Wolf's-bane.

A tufted plant. Stem 6-12 in. high, erect or decumbent, few-leaved. The black root of two knobs, spindle-shaped. Leaves 1-2 in. diameter, many-lobed to the base, lobes cut into linear segments. Flowers few or many along a common axis, $\frac{3}{4}$-1 in. long, bright or dull greenish blue or purplish. Sepals large, coloured, the upper enclosing the rest, and curved back, helmet-shaped, three times as long as high. Petals small, 2-5, the two upper swollen above, forming spurs which are bent down, horizontal. Filaments hairy, with blunt-pointed wings. Fruit of 3-5 hairy follicles which are cylindrical, beaked and many-seeded. Seeds black, triangular, wrinkled.

Flowers.—August to October.

Locality.—Aporwat, above Gulmarg, open stony ground, 12,000-13,500 ft., common.

Distribution.—The type occurs in temperate and arctic Europe, Asia and America.

Fig. 5. Aconitum napellus, Linn.; var. **rotundifolium**, Hook. f. & T. Monkshood.

This variety is like the previous variety *multifidum* except for the leaves which are not divided to the base.

Flowers.—August, September.

Locality.—Khelanmarg, above Gulmarg, open margs and hill-sides, above 10,000 ft., common.

Fig. 6. Aconitum violaceum, Jacq.

Stem erect or ascending, simple or rarely branched below, slender, hairy above, smooth below, rarely quite smooth, $\frac{1}{3}$-1 ft. high. Leaves, except the uppermost, on long, slender stalks; upper stem-leaves smaller, short-stalked or almost sessile. Flowers few, sometimes only one; flower-stalks up to 2 in. long. Sepals violet, blue or yellowish and variegated with blue, hairy; the uppermost helmet- or almost boat-shaped, $\frac{3}{5}$-$\frac{4}{5}$ in. high and up to 1 in. from the tip to the base. Filaments hairy in the upper part, winged below. Fruit of 5, erect, hairy follicles. Seeds 3-sided, up to $\frac{1}{3}$ in. long.

Flowers.—July.

Locality.—Burzil La; Margan Pass; from Gulmarg up to 14,000 ft.; on the pass above Kilian, 13,000 ft.; above Pir Panjal 9,000-10,000 ft.; Zoji La; Deosai plain; Marpur nala, 13,000-14,000 ft.; Pensi La, 12,000-15,000 ft.

Distribution.—Alpine Himalaya from Gilgit to Kumaon, 10,000-15,000 ft.



FIGS.—1, *Aquilegia vulgaris*, Linn., var. *pyrenaica*, Hook. f. & T.; 2, *Aquilegia vulgaris*, Linn., var. *alpina*, Hook. f. & T.; 3, *Aquilegia vulgaris*, Linn., var. *vulgaris proper*, Hook. f. & T.; 4, *Aquilegia vulgaris*, Linn., var. *jucunda*, Hook. f. & T.; 5, *Paeonia Emodi*, Wall.

Plate 6

AQUILEGIA, Linn. Columbine.

I. Sepals egg-shaped, sharp-pointed. Spur very long, slender, straight or hooked } *A. vulgaris*, var. *pyrenaica*.

II. Sepals blunt or almost sharp-pointed. Spur nearly straight } *A. vulgaris*, var. *alpina*.

III. Sepals egg-shaped, blunt. Spur hooked, as long as the blade of the petal ... } *A. vulgaris*, var. *vulgaris* proper.

IV. Sepals very broadly egg-shaped. Spur short, much bent } *A. vulgaris*, var. *jucunda*.

Under fig. 3 the typical form of *Aquilegia vulgaris* has been described. Figs. 1, 2 and 4 represent some varieties which differ in a number of details from the type, especially with regard to the sepals and spur.

The authors of the "Flora of British India" distinguish six subspecies which are not well characterized, and I think that a careful study of living Himalayan material will reveal quite a number of distinct species; but it is also possible that such a variety of transition forms may be found that the subspecies mentioned in the "Flora of British India" must lose their rank as subspecies and have to be reduced to ordinary forms. Amateurs can do useful work by studying the variations of flowers and leaves in various localities and, if possible, by supplying the authorities at the Sibpur Botanic Gardens or at Kew not only with detailed and accurate coloured sketches but also with carefully pressed specimens.

Fig. 1. Aquilegia vulgaris, Linn., var. pyrenaica, Hook. f. & T. Pyrenean Columbine.

A tall perennial herb, 2-4 ft. high, softly hairy or glandular, often bluish-green. Flowers often white and sweet-scented. Sepals egg-shaped, sharp-pointed. The outer petals occasionally vary to blue. Spur very long, slender, straight or hooked.

Flowers.—July, August.

Locality.—Aporwat and surrounding hills.

Distribution.—Alpine and temperate W. Himalaya, 10,000-14,000 ft.

Fig. 2. Aquilegia vulgaris, Linn., var. alpina, Hook. f. & T. Alpine Columbine.

A perennial herb, hairy or glandular. Leaflets generally much cut. Flowers very large. Sepals blunt or almost sharp-pointed. Spur nearly straight.

Flowers.—June, July.

Locality.—Gulmarg, woods, above 8,000 ft., fairly common.

Distribution.—Temperate and alpine W. Himalaya.

Fig. 3. Aquilegia vulgaris, Linn., var. **vulgaris** proper, Hook. f. & T. Columbine, Blue Starry, Boots and Shoes, Lock's-foot, Granny's Nightcap, Hawk's-feet, Hen and Chickens, Lady's Slippers.

A tall, graceful plant, up to 3 ft. high. Stem with few leaves, leaves twice divided into 3 leaflets. Flowers large, drooping, blue or white, in a raceme or group. Sepals 5, petal-like. Petals 5, large, conspicuous, each one hollowed from the claw upwards to form a hollow spur or horn-shaped cavity, $\frac{3}{5}$-almost 1 in. long; spur curved inwards and downwards above, containing the honey secreted by a fleshy thickening; the flat part of the petal is blunt and shorter than the stamens. Fruit of 5 erect follicles. Seeds black and shining, minutely granular.

Flowers.—June.

Locality.—Aporwat, grassy and rocky hillside, often growing amongst dwarf Rhododendrons, above about 10,500 ft.; near Shirazia Bagh on jungly slopes, near top of hills; in forest N. of Hayan Pass; Tosh Maidan.

Distribution.—Temperate zone of Europe and Asia, temperate and subalpine W. Himalaya.

Fig. 4. Aquilegia vulgaris, Linn., var. **jucunda,** Hook. f. & T.

Stem simple, 4-8 in. high, leafless or with 1 small leaf. Flower very large, dark purple. Sepals very broadly egg-shaped. Spur short, much bent.

Flowers.—June, July.

Locality.—Gulmarg, above 8,000 ft., fairly common.

Distribution.—Temperate Kashmir.

PAEONIA, Linn.

Fig. 5. Paeonia Emodi, Wall. The Himalayan Peony, "Mid" in Kashmir. Coventry pl. x.

A stout, erect, smooth, perennial herb, 1-2½ ft. high. Leaves alternate, 6-12 in. long, stalked, divided into distinct leaflets or deeply cut into segments, segments pointed, entire. Flowers few, showy, 3-4 in. across, white or red, usually solitary in the axils of the upper leaf, flower-buds globose. Sepals 5, round, concave, green, persistent, outer ones with a leafy point. Petals 5-10. Stamens many. Fruit usually of a single 1 in. long follicle, rarely of two.

This is the only species of the genus in Kashmir.

Flowers.—May, June.

Locality.—Gulmarg, wooded hillsides, usually in N. aspect and shady places; Nagmarg; Liddar Valley near Pahlgam; at elevations of 7,000-10,000 ft.

Distribution.—N.-W. Himalaya from Kashmir to Kumaon.



FIGS.—1, *Podophyllum Emodi*, Wall.; 2, *Podophyllum Emodi*, Wall.; 3, *Nelumbium speciosum*, Willd.

Plate 7

BERBERIDACEAE. The Barberry Family.

PODOPHYLLUM, Linn.

Figs. 1 and 2. **Podophyllum Emodi**, Wall. Coventry pl. XI.

A smooth, succulent, erect herb. Rootstock creeping. Flowering stem 6-18 in. high, leafy on the upper portion. Leaves 1-3, usually 2, alternate, long-stalked, often purple-spotted, round, 6-10 in. diameter, deeply divided to the middle or base into 3-5 lobes, which are sharply-toothed and often with deep incisions. Flowers 1½-2 in. diameter, solitary, rarely 2, cup-shaped, white, sometimes pink, appearing at the same time as the leaves. Sepals 3, petal-like, soon falling off. Petals 6. Stamens 6. Fruit a large scarlet pulpy berry, 1-2½ in. in length, containing many seeds.

This is the only species of the genus.

Flowers.—May, June.

Locality.—Tanmarg, forest, 7,200-8,700 ft.; Basam Gali in Juniper tract, above 10,000 ft.; Gulmarg, fir forest and among low-growing shrubs above 8,000 ft., common.

Distribution.—Interior ranges of the Himalaya from Hazara and Kashmir to Sikkim.

NYMPHAEACEAE. The Water-Lily Family.

NELUMBIUM, Juss.

Fig. 3. **Nelumbium speciosum**, Willd. Lotus.

A large erect water-plant with milky juice. Rootstock stout, creeping. Leaf- and flower-stalks 3-6 ft. high, smooth or with small scattered prickles. Leaves raised high above the water, 2-3 ft. diameter, cupped. Flowers rose-red, white or yellow, 4-10 in. diameter. Sepals 4-5, soon falling off. Petals and stamens many. Fruiting disk 2-4 in. diameter.

This is the only species of the genus in India.

Flowers.—July.

Locality.—In tanks.

Distribution.—Throughout India up to Kashmir, Persia, Malay Islands, China, Japan, Tropical Australia.

Plate 8

EURYALE, Salisb.

Fig. 1. Euryale ferox, Salisb.

A densely prickly aquatic plant; rootstock thick, short. Leaves 1-4 ft. diameter, round or elliptic, green above, red or purple and downy beneath with strong spiny ribs. Flowers 1-2 in. long, green and shining outside, bright red inside, partially submerged. Sepals 4, erect. Petals many, in 3-5 series, shorter than the sepals. Stamens many, in fascicles of 8. Fruit a spongy berry surmounted by the persistent sepals. Seeds 8-20.

Flowers.—June.

Locality.—Dal Lake.

Distribution.—Oudh, Kashmir, E. Bengal, China.

PAPAVERACEAE. The Poppy Family.

PAPAVER, Tourn. The Poppy.

1. Petals yellow or orange-yellow or orange-red	*P. nudicaule.*
2. Petals red with a dark spot at the base	*P. dubium.*
3. Petals scarlet	*P. rhoeas.*

Figs. 2 and 3. Papaver nudicaule, Linn. Orange or Yellow Poppy.

A perennial hairy plant, 10-12 in. high. Rootstock scaly. Leaves 2-4 in. long, all arising from the base, pinnately lobed, hairy. Flowering stems several, 4-12 in. high. Flowers 2-3 in. diameter, yellow or orange-yellow or orange-red. Sepals densely hairy. Capsule covered with bristles.

Flowers.—August.

Locality.—Aporwat above Gulmarg, stony ground beside torrent, about 11,000 ft., very rare; above Zoji La; Kolohoi, stony ground between streams below glacier, about 12,000 ft.

Distribution.—Mountains of Central and Northern Europe, N. Asia, arctic regions, Afghanistan, W. Himalaya, from 16,000-17,000 ft.



FIGS.—1, *Euryale ferox*, Salisb.; 2, *Papaver nudicaule*, Linn.; 3, *Papaver nudicaule*, Linn.; 4, *Meconopsis aculeata*, Royle.

Papaver dubium, Linn.

Nearly smooth. Stems 1-2 ft., juice milky. Leaves stalkless, 3-6 in. long, pinnately divided, segments lobed. Flowers 1-2 in. diameter, on long bristly stalks. Sepals 2. Petals 4, red, usually with a dark spot at the base, soon falling off. No style. Stigmas linear, 6-12. Fruit a capsule, $\frac{3}{4}$-1 in. long, smooth.

There are three colour-forms. Generally all 4 petals have a black mark at the base, sometimes only one pair, and in other cases none at all.

Flowers.—May.

Locality.—Srinagar, in field on left bank of Jhelum; Saida Kadal, in wheat-fields; Zervan, wheat-fields.

Distribution.—Europe, W. Asia, Afghanistan, W. Himalaya, from Hazara and Kashmir to Garhwal.

Papaver rhoeas, Linn. The Field Poppy, Common Poppy, Corn Rose, Corn Poppy.

An annual branched bristly plant, 1-2 ft. high. Leaves pinnately divided, segments more or less cut, awned. Flowering stem with spreading or appressed hairs. Flowers 3-4 in. diameter, scarlet. Petals 4, in unequal pairs. Stigmas linear, 8-12. Fruit a capsule, smooth, stalked.

Locality.—In fields.

Distribution.—Europe, W. Asia, N. Africa, Kashmir.

MECONOPSIS, Vig.

Fig. 4. Meconopsis aculeata, Royle. The Blue Poppy. *See also* Frontispiece and Coventry pl. XIII.

Stem 1-2 ft. high, stout, leafy, with short scattered prickles. Leaves 4-8 in. long, irregularly pinnately divided, long-stalked, with scattered prickles. Flowers 2-3 in. diameter, many on an undivided axis, greyish steel-blue to a darker blue or purple-blue (Royle Ill. t. 15 has scarlet flowers); flower-stalks slender, prickly. Sepals 2, falling when the flower opens. Petals 4. Stamens many. Fruit a densely prickly capsule, $\frac{1}{2}$-$\frac{2}{3}$ in. long; style half as long.

Flowers.—July, August.

Locality.—Tragbal, Gungabal and in moraines and on big rocks on hill-sides, above 11,000 ft., nowhere abundant, but to be met with near most of the passes at a suitable altitude, usually in N. aspect; hills above Sonamarg.

Distribution.—W. Himalaya, from Kashmir to Kumaon.

This is the only species occurring in Kashmir.

Plate 9

FUMARIACEAE.

CORYDALIS, DC. The Fumitory.

A. Root spindle-shaped, spur as long as or longer than the petals.
 I. Flowers yellow with purple tips.
 1. Stems erect.
 a. Radical leaves 6-12 in. long *C. Gortschakovii.*
 b. Radical leaves 3-8 in. long *C. Moorcroftiana.*
 2. Stems procumbent *C. cornuta.*
 II. Flowers yellow.
 1. Flowers ½ in. long.
 a. Capsule linear or linear-inversely egg-shaped... *C. longipes.*
 b. Capsule inversely egg-shaped, oblong ... *C. ramosa.*
 2. Flowers 1 in. long *C. Govaniana.*
 3. Flowers ⅜-¾ in. long... ... *C. stricta.*
 III. Flowers white or yellowish, variegated with purple *C. crassifolia.*

B. Root bulbous or rootstock elongate.
 I. Flowers bright-blue with dark-blue tips *C. cashemiriana.*
 II. Flowers purple with dark tips ... *C. rutaefolia.*

C. Root spindle-shaped. Spur short, bag-shaped.
 I. Flowers yellow with brown tips... *C. adiantifolia.*
 II. Flowers yellow *C. flabellata.*

Fig. 1. **Corydalis Gortschakovii**, Schrenk.

Rootstock woody, spindle-shaped. Stem 1-2 ft. high, erect, quite smooth, simple or branched. Radical leaves 6-12 in. long, long-stalked, many times divided, last segments incised. Flowers ⅜-1 in. long, yellow with purple tips, many arising from an undivided axis which may be terminal or in the axils of leaves. Posterior outer petal as long as the straight blunt spur. Fruit and seed as in the next species.

There is not a great difference between this species and *C. Moorcroftiana* described below. The former is on the whole a larger plant (stem and leaves) and the flowers are longer, the leaves are often divided. In my opinion the two species should be united, but more material is required to decide the question.

Locality.—Above Gulmarg, edge of streams, above 10,000 ft., common.

Distribution.—Tibetan Himalaya, Soongaria.

Corydalis Moorcroftiana, Wall.

Rootstock woody, spindle-shaped, stout, clothed with withered sheaths. Stem 6-18 in. high, stout, ereet, more or less glandular, with or without leaves, simple or branched. Leaves 3-8 in. long, several times pinnately divided, and variously cut and lobed. Flowers $\frac{3}{4}$ in. long, yellow with purple tips, many stalked or on an undivided axis. Posterior petal as long as the straight blunt spur. Fruit a capsule, pointed at both ends, $\frac{1}{2}$ in. long, tipped by the style which is half as long as the capsule. Seeds black, shining.

Can be distinguished from *C. Govaniana* by the purple tips of the yellow petals and the straight spur.

Locality.—Baltistan.

Distribution.—Afghanistan, W. Tibet, 10,000-17,000 ft.

Corydalis cornuta, Royle. Collett, fig. 9.

Stems procumbent, 6-24 in. high, leafy; branches usually long and straggling. Leaves 2-3 times pinnately divided, long-stalked; leaflets deeply lobed, segments entire, sometimes lobed. Flowers yellow, tipped with dark purple, $\frac{1}{2}$-$\frac{3}{4}$ in. long, crowded on an undivided axis which is 1-3 in. long. Posterior outer petal convex, winged on the back, shorter than the cylindric curved blunt spur. Fruit a capsule $\frac{1}{2}$ in. long, stalks bent down.

Flowers.—July to October.

Locality.—In forests.

Distribution. — Temperate Himalaya from Kashmir to Kumaon, 7,000-10,000 ft.

Fig. 2. Corydalis longipes, DC.

An almost bluish-green herb. Stem 1-2 ft. high, prostrate, branched, leafy. Leaves twice to thrice pinnate, membranous, segments 3-5, broad-egg-shaped, deeply cut. Racemes loose, few-flowered, ending long, slender branches. Flowers yellow, $\frac{1}{2}$ in. long. Posterior petal hooded, as long as or longer than the very broad, conic, blunt, recurved spur. Capsule $\frac{1}{4}$-$\frac{1}{2}$ in. long, linear or linear-inversely egg-shaped. Seeds shining.

Flowers.—July.

Locality.—Nil Nag.

Distribution. — Temperate and alpine Himalaya, from Kashmir to Sikkim, 7,000-14,000 ft., Khasia Hills, 6,000 ft., Eastern Siberia.

Corydalis ramosa, Wall.

Rootstock spindle-shaped. Stem procumbent, 1-2 ft. high, weak, often leafy, branches usually long and straggling. Radical leaves 2-3 times pinnately divided, leaflets deeply lobed, segments small, entire. Flowers ½ in. long, yellow, arising laxly from an undivided axis which measures up to 5 in. in length. Posterior outer petal hooded, winged on the back, as long or shorter than the blunt spur. Fruit a capsule, ⅓ in. long, stalk bent down. Seeds shining.

The leaves and the posterior petal vary a good deal.

The procumbent habit and the smaller purely yellow flowers distinguish this species from *C. Moorcroftiana* and *Gortschakovii*.

Flowers.—May to August.

Locality.—Up to 12,000-15,000 ft.

Distribution. — Temperate Himalaya from Kashmir to Sikkim.

Fig. 3. Corydalis Govaniana, Wall.

Rootstock woody, thick, crowned with withered leaf-sheaths. Stem 1-2 ft., often tufted, erect, as thick as the thumb, almost leafless or with 1-2 leaves near the top. Radical leaves many, nearly as long as the stem, long-stalked, twice pinnate, cut to the base, leaflets wedge-shaped, deeply lobed. Stem-leaves similar, but smaller. Flowers 1 in. long, bright yellow, crowded, arising on stalks from an undivided axis which is 2-4 in. long. Posterior petal very convex, spur slender, conical, curved. Fruit a capsule, ½-⅔ in. long.

Flowers.—June.

Locality.—Basam Gali, in Juniper tract above 10,000 ft.; Tosh Maidan.

Distribution.—W. Himalaya, from Kashmir to Kumaon, 8,000-12,000 ft.

Corydalis stricta, Stephan.

Rootstock spindle-shaped, crowned with shining leaf-bases. Stem 1-2 ft. high, erect, simple or branched. Radical leaves many, thick, 3-6 in. long, long-stalked, twice pinnately divided, stem-leaves similar. Flowers ⅔-¾ in. long, yellow, stalks short, pendulous, arising from a simple or branched axis; bracts (small leaflets at the base of the flower stalk), white, membranous; stalks pendulous. Sepals lance-shaped, base fringed. Posterior petal nearly flat, tip bent back. Fruit a capsule, 1-1½ in. long. Seeds shining.

Locality.—Ladakh.

Distribution.—W. Tibet, 14,000-16,000 ft., Altai Mountain.



FIGS.—1, *Corydalis Gortschakovii*, Schrenk.; 2, *Corydalis longipes*, DC.; 3, *Corydalis Govaniana*, Wall.; 4, *Corydalis crassifolia*, Royle; 5, *Corydalis cashemiriana*, Royle; 6, *Corydalis rutaefolia*, Sibth.

Fig. 4. Corydalis crassifolia, Royle.

Rootstock prostrate, woody. Stem 3-8 in., simple. Radical leaves few, 2-5 in. diameter, early withering, almost fleshy, long-stalked, kidney-shaped, 3-5-lobed or -parted, lobes crenate or again lobed; stem-leaves 1-3, almost stalkless. Flowers ¾-1¼ in., white or yellowish, variegated with purple, on an unbranched or branched axis which is 1-3 in. long. Posterior petal broad, blunt, wingless, as long as the cylindric curved spur. Fruit a capsule, 1 in. diameter, inflated, style short, persistent.

Flowers.—July.

Locality.—Zoji La.

Distribution.—W. Tibet and Tibetan Himalaya, 14,000-17,000 ft.

Fig. 5. Corydalis cashemiriana, Royle. Kashmir Corydalis.

Root bulbous, small, scaly. Stem 2-6 in. high. Radical leaves palmately 3-5-parted, long-stalked, withering early; stem-leaves near the top of the stem, almost stalkless, 3-6-parted, lobes linear, ½-1 in. long. Flowers ½-1 in. long, bright blue with dark blue tips, usually 3-8 on an undivided axis. Sepals 2, small. Petals 4, the 2 outer dissimilar, of which the posterior (upper) is concave with a long spur at the base.

The upper leaves and colour of flowers distinguish this species from *C. rutaefolia.*

Flowers.—August.

Locality.—Yamher Pass; Pirpanjal, open stony ground, moist places above 11,000 ft., not common.

Distribution.—Temperate and subalpine Himalaya, from Kashmir to Sikkim.

Fig. 6. Corydalis rutaefolia, Sibth.

Rootstock slender. Stem 3-8 in. high, erect, simple. Leaves opposite or whorled, 2-3, pinnately divided, pinnules with 3 leaflets, leaflets entire, variable in size. Flowers 3-10, stalked on an undivided axis, ¾-1 in. long, purple, tips dark. Sepals 2, very small. Upper petal of the outer ones broad, concave, produced at the base into a hollow blunt spur. Style shorter than the oblong ovary. Fruit a capsule ⅓-in. long.

Flowers.—May.

Locality.—Gulmarg, woods, above 8,000 ft., common, Khelanmarg, 10,000 ft.

Distribution.—Levant, W. Asia, W. Himalaya, from Murree to Kumaon, 6,000-11,000 ft., China.

Corydalis adiantifolia, Hook. f. & T.

Rootstock stout, woody, crowned with withered sheaths. Stems 6-18 in. high, many-branched from the base. Leaves 3-6 in., pinnately divided, leaflets 2-5 pair, round or kidney-shaped, ½-¾ in., entire, crenate or 3-5-lobed. Flowers ¾-1 in., yellow, tips brown, densely arranged on an undivided axis, 1-3 in. long, flower-stalks very short. Sepals membranous, base fringed. Posterior petal nearly straight, much longer than the inflated blunt curved spur. Fruit a capsule, 1 in. long, long-pointed at both ends; style straight.

Locality.—Zaskar.

Distribution.—W. Himalaya, 12,000-14,000 ft.

Corydalis flabellata, Edgew.

Stem 2-3 ft. high, erect, rigid, much-branched. Leaves 6-8 in., pinnate, leaflets 4-6 pair, ½-1½ in. diameter, crenate or lobed. Flowers ½-¾ in., yellow, curved, on a branching axis 2-6 in. long; flower-stalks very short. Posterior petal blunt, concave, twice as long as the bent-down inflated spur. Fruit a capsule ½-1 in., linear, spreading or deflexed; style slender. Seeds 8-10, dotted, shining.

Locality.—Baltistan.

Distribution.—W. Himalaya, from Gilgit to Kumaon, 9,000-12,000 ft.

Plate 10

CRUCIFERAE. The Crosswort Family.

BARBAREA, Br.

I. Pod straight.
 1. Pod with an awl-shaped point ... *B. vulgaris.*
 2. Pod with a short point almost as broad as the pod *B. sicula.*

II. Pod slightly curved *B. praecox.*

Fig. 1. Barbarea vulgaris, Br. Winter Cress, Yellow Rocket, St. Barbara's Herb.

An erect plant, 6-18 in. high. Main stem single, rarely branched, usually smooth, rarely downy, angular. Radical leaves stalked, with a large end-lobe and smaller paired lobes; upper leaves inversely egg-shaped, sometimes arranged on either side of a common stalk and toothed. Flowers yellow, small, ⅛ in. diameter, growing in loose racemes. Sepals 4, erect, equal, similar. Petals 4, clawed. Stamens 6, 2 short and 4 long. Style short, stout, straight. Fruit a pod, linear, ¾-1½ in., stalks erect or slightly spreading, 4-angled, with an awl-shaped point. Seeds in one row.

Flowers.—May.

Locality.—Gulmarg, near water-courses, above 8,000 ft., common.

Distribution.—Arctic and temperate zone, arctic Europe, Asia, the Himalayas up to 17,000 ft., S. Africa, Australia, N. America.

Fig. 2. Barbarea praecox, Fries.

Nearly related to the foregoing species, but the upper leaves are egg-shaped, entire or toothed, the stalks of the ripe pods are almost horizontal, the pods erect, stout, rigid, a little curved, and the style rather long and slender. The pods vary from $\frac{3}{4}$-$1\frac{1}{2}$ in. in length.

Flowers.—May, June.

Locality.—Gulmarg, water-courses, above 8,000 ft., common; Tanmarg forest, 7,200-8,700 ft.

Distribution.—W. Asia, Afghanistan, W. Himalaya.

Barbarea sicula, Presl.

Closely allied to *Barbarea vulgaris* and *B. praecox*, but the plant is less robust, the lower leaves lyrate, the end-lobes are egg-shaped, the lateral ones often wanting, the upper leaves pinnate, segments linear. Stalks of ripe pods less spreading than in *B. praecox*. Pods straight, narrow, compressed, showing faintly successive rounded swellings. Style short, almost as broad as the pod.

Flowers.—May.

Locality.—Tanmarg, forest, 7,200-8,700 ft.

Distribution.—S. Europe, Asia Minor, temperate Himalaya, 6,000-17,000 ft.

CARDAMINE, Linn.

I. Flowers nearly $\frac{1}{2}$ in. long, petals spreading *C. macrophylla.*

II. Flowers $\frac{1}{10}$ in. long. Petals almost erect.

1. Stem-leaves not lobed at the base.
 - *a.* Pods blunt *C. sylvatica.*
 - *b.* Pods pointed *C. oxycarpa.*
2. Stem-leaves lobed at the base ... *C. impatiens.*

Fig. 3. Cardamine macrophylla, Willd.

A stout, erect, perennial plant; rootstock creeping. Stems herbaceous, 1-$2\frac{1}{2}$ ft., smooth, striated. Leaves 6 in. long; radical leaves few, soon disappearing, segments usually 9, $1\frac{1}{2}$-3 in. long, irregularly sharply and deeply toothed, ending in a long, almost entire, tail-like point; segments of the stem-

leaves smaller and more numerous. Flowers white, violet or lilac, nearly ½ in. long, crowded. Petals more than twice as long as the sepals, spreading. Pods ¾ in. long, erect in the beginning, finally spreading.

Flowers.—May, June.

Locality.—Below Basam Gali in damp ground; Gulmarg, stony water-courses in woods, above 8,000 ft., common; Tanmarg, forests, 7,200-8,700 ft.; Khelanmarg, 10,000 ft.

Distribution.—Temperate Himalaya, 7,000-12,000 ft., N. Asia, Japan.

Cardamine sylvatica, Link. Bitter Cress.

A smooth annual herb; stem 3-12 in. high, weak. Leaves 2-6 in.; radical leaves few, segments about 7, broadly ovate or orbicular, with a few large lobe-like teeth; segments of the uppermost leaves often narrowly oblong, end-segment largest, blunt or rounded. Flowers white, $\frac{1}{10}$ in. long. Petals longer than the sepals, almost erect. Stamens 6. Stigma nearly sessile. Pods ½-1 in., blunt, erect.

Locality.—Temperate part of Kashmir.

Distribution.—All temperate regions.

Cardamine oxycarpa, Collett.

A diffusely branched herb. Stem 6-18 in. high, erect. Leaves 2-3 in. long; radical leaves few, segments about 7, oblong-egg-shaped, crenate, the end-one much the longest, tapering; stem-leaves not lobed at the base. Flowers white, $\frac{1}{10}$ in. long. Petals longer than the sepals, almost erect. Style slender, distinct. Pods 1-1¼ in. long, pointed, erect in the beginning, finally spreading.

Locality.—In the lower hills.

Distribution.—Hilly districts throughout India, up to 9,000 ft.

Cardamine impatiens, Linn. Mountain Bitter Cress.

Stem erect, smooth, 6-18 in. high, stiff, branched. Root-stock spindle-shaped. Leaves 3-4 in. long, radical ones few or many, base of the stem-leaves dilated and furnished with 2 long, stem-clasping lobes; segments 7-15, sometimes alternate, those of the radical leaves egg-shaped, bluntly lobed, of the stem-leaves longer, lanceolate, entire. Flowers white, $\frac{1}{10}$ in. long, crowded in a panicle. Petals shorter than the sepals, nearly erect. Anthers yellow. Style slender. Pods ¾-1 in., shortly stalked, erect, pointed, with many seeds.

Flowers.—July.

Locality.—Mekhowali, in forest clearings, 9,000 ft.

Distribution.—Temperate Europe, Asia, temperate Himalaya from Kashmir to Sikkim, 5,000-12,000 ft.



FIGS.—1, *Barbarea vulgaris*, Br.; 2, *Barbarea praecox*, Fries; 3, *Cardamine macrophylla*, Willd.; 4, *Erysimum Melicentae*, Dunn; 5, *Erysimum altaicum*, C. A. Mey.; 6, *Erysimum hieraciifolium*, Linn.

ERYSIMUM, Linn.

I. Flowers orange.
 1. Flowers $\frac{3}{5}$ in. diameter *E. Melicentae.*
 2. Flowers $\frac{1}{4}$-$\frac{1}{3}$ in. diameter ... *E. hieraciifolium.*

II. Flowers yellow.
 1. Flowers $\frac{1}{4}$-$\frac{1}{3}$ in. diameter ... *E. repandum.*
 2. Flowers $\frac{1}{3}$-$\frac{1}{2}$ in. diameter ... *E. altaicum.*
 3. Flowers $\frac{1}{2}$-$\frac{3}{4}$ in. diameter ... *E. odoratum.*

Fig. 4. Erysimum Melicentae, Dunn.

A biennial herb, 1-2$\frac{1}{3}$ ft. high. Stem often simple. Radical and stem-leaves linear-lance-shaped, pointed at tip, getting narrower towards the base, stalkless, up to 3$\frac{1}{2}$ in. long, obscurely toothed, hairy. Flowers large, $\frac{3}{5}$ in. long and broad, orange; stalks $\frac{1}{2}$ in. long. Sepals erect, linear-oblong, blunt, hairy, veined, about $\frac{1}{3}$ in. long, lateral ones bag-shaped at the base. Petals twice as long as the sepals; claw slender, limb inversely egg-shaped. Stamens as long as the sepals or slightly longer. Anthers deeply 2-lobed. Style elongate; stigma disc-shaped. Pod striate, erect, stalked, 4-angled, 1$\frac{3}{5}$-2$\frac{2}{5}$ in. long, terminated by a slender style. Seeds many, in one row, finely dotted.

Flowers.—August.

Locality.—Ferozepore nala below Gulmarg, rocks in torrent, about 8,000 ft.; Darawai Pass, 10,000 ft.

Distribution.—Endemic in Kashmir.

Erysimum odoratum, Ehrh.

An erect robust herb. Stem leafy, angular above. Leaves oblong or lance-shaped, sinuate-toothed or entire, rough with hairs. Flowers $\frac{1}{2}$-$\frac{3}{4}$ in. diameter, yellow. Stalks half as long as the sepals. Pods not erect.

Closely allied to *E. Melicentae*, which however can easily be distinguished by the usually larger flowers, by the orange petals and the erect pods.

Locality.—At altitudes of 5,000-7,000 ft.

Distribution.—W. Himalaya up to 9,000 ft.

Fig. 5. Erysimum altaicum, C. A. Mey.

A very hairy plant. Stem stout, short, erect, leafy. Leaves stalked, linear-lance-shaped, entire or sinuate-toothed; radical leaves sometimes pinnately divided with a triangular end-lobe

and other sharp segments pointing downwards. Flowers large, yellow, ⅜-½ in. diameter. Stalks shorter than the sepals.

Flowers.—June to August.

Locality.—Near Shirazia Bagh, on hill; towards top of Hayan Pass, above 9,000 ft.; Aporwat, rare; Liddar Valley; Lolat Valley in open stony pastures, above 9,000 ft., common.

Distribution.—Caucasus, Altai Mts., W. Himalaya, 7,000-10,000 ft.

Fig. 6. Erysimum hieraciifolium, Linn.

A stout or slender green herb, covered with appressed, forked, star-shaped and simple hairs. Stems erect, 6-24 in. high, angled. Stem-leaves stalkless, oblong, 1-4 in. long, sinuate-toothed or nearly entire. Flowers orange-yellow, ¼-⅜ in. diameter, crowded along an unbranched axis. Sepals erect, lateral ones slightly bag-shaped. Petals with a long claw. Style distinct, 2-lobed. Pods linear, 1¼-2 in. long, erect, almost square. Stalks stout, upcurved. Seeds in one row.

Can be distinguished from the other Kashmir species by the slender, erect, narrow pods which are borne on stout, upcurved stalks, and by the distinct slender style.

Flowers.—May.

Locality.—Hills above Srinagar, rocky slopes, about 6,000 ft., fairly common.

Distribution.—N. Europe, N. Asia, Western and Central Himalaya, 6,000-13,000 ft.

Erysimum repandum, Linn.

An annual, much-branched, very hairy plant, 6 in. to 1 ft. high; hairs simple. Leaves lance-shaped, toothed or entire. Flowers ¼-⅜ in. diameter, pale yellow. Pods rigid or flexuous, bluntly 4-angled, smooth, up to the truncate stigma. Stalk $\frac{1}{12}$ in. long, as thick as the pod.

Locality.—At altitudes of 5,000-7,000 ft.

Distribution.—Europe, N. Africa, Persia.

Plate 11

DRABA, Linn.

A. Flowers yellow.
 I. Leaves not rigid, without a strong midrib beneath, pod straight ... *D. alpina.*
 II. Leaves rigid, with a stout midrib beneath, pod twisted *D. glacialis.*
B. Flowers white (sometimes yellow in *D. stenocarpa*).
 I. Stem leafy.
 a. Pods notched at tip ... *D. incana.*
 b. Pods not notched at tip... *D. stenocarpa.*
 II. Stem leafless or with 1-3 leaves.
 1. Stem-leaves not clasping.
 a. Leaves white *D. lasiophylla.*
 b. Leaves not white.
 i. Leaves lance-shaped *D. fladnitzensis.*
 ii. Leaves spoon-shaped-lance-shaped ... *D. tibetica.*
 2. Stem-leaves clasping *D. muralis.*

Fig. 1. Draba alpina, Linn.

A perennial herb. Stems densely tufted, up to 10 in. high. Leaves forming dense rosettes, oblong, spoon-shaped or lance-shaped, ¼-1 in. long, covered with simple and branched hairs, or smooth with stiff hairs on the margin. Flowering stems ⅙-6 in. high, 1-10-flowered, leafless or 1-leaved. Flowers yellow, rather large. Sepals usually smooth. Pods ⅙-¼ in., elliptic, smooth, straight, in a short raceme, containing 4-10 seeds. Stalks almost erect, hairy or smooth, long. Style very short.

Flowers.—July.

Locality.—Aporwat, above Gulmarg, stony hill-top, about 13,000 ft., common; Damam Sar, 13,000 ft.

Distribution.—N. Europe, W. Asia, alpine Himalaya, from Kashmir to Sikkim, W. Tibet, arctic regions, Rocky Mountains.

Fig. 2. Draba sp.

Flowers yellow. Pods short.

Flowers.—July.

Locality.—Damam Sar.

Draba glacialis, Adams.

Root woody, slender. Branches many, prostrate, tufted. Leaves linear, densely tufted, rather rigid, entire, rough, with stiff hairs on the margin, with a stout midrib beneath. Flowering stems 1-5 in. high, many, erect, stiff. Flowers yellow, crowded near the tip of the flowering stem. Flower-stalks and sepals smooth. Pods $\frac{1}{6}$-$\frac{1}{3}$ in. long, erect, egg-shaped, lance-shaped, pointed, twisted, smooth.

Very nearly related to *Draba alpina*, but can be distinguished by the rigid linear leaves and twisted pods.

Flowers.—July.

Locality.—Alpine Kashmir.

Distribution.—W. Tibet and Kunawer, 10,000-15,000 ft.; arctic Asia and America, Soongaria, Rocky Mountains.

Draba incana, Linn. Twisted Pod Whitlow Grass.

Rootstock often woody and long. Stem leafy, simple or branched, erect, 2-20 in. high, covered with star-shaped hairs. Radical leaves lance-shaped, oblong, toothed, spreading, forming a dense rosette, downy with star-shaped hairs. Stem-leaves few, stalkless, toothed or rarely entire, stem-clasping more or less erect. Flowers numerous, white, on short stalks in a long raceme. Petals twice as long as the sepals, inversely egg-shaped, notched at the tip. Style short. Pods linear, oblong, lance-shaped, twisted, longer than the stalks, which are erect or spreading, smooth or nearly so, blunt or pointed, variable. Seeds numerous.

Locality.—Alpine regions.

Distribution.—Alpine Himalaya from Kashmir to Sikkim, 10,000-17,000 ft., alpine and arctic N. Europe, Asia and America.

Fig. 3. Draba stenocarpa, Hook. f. & T.

Stem simple, erect, 6-12 in. high, slightly rough. Leaves entire or nearly so; radical leaves rosulate, linear-oblong or obovate, thickly covered with forked hairs; stem-leaves 2-5. Flowers white, rather large, forming racemes. Petals narrow wedge-shaped, entire. Pods $\frac{1}{3}$-$\frac{2}{3}$ in. in long racemes, tapering at both ends, straight; stigma stalkless. Seeds many. Stalk of fruit slender, smooth, ascending.

Flowers.—July.

Locality.—Zoji La.

Distribution.—Temperate W. Himalaya, Persia.



FIGS.—1, *Draba alpina*, Linn.; 2, *Draba sp.*; 3, *Draba stenocarpa*, Hook f. & T.; 4, *Iberidella Andersoni*, Hook. f. & T.; 5, *Christolea crassifolia*, Camb.; 6, *Chorispora sabulosa*, Camb.; 7, *Chorispora sabulosa*, Camb.

Draba lasiophylla, Royle.

Stems simple, erect, sparsely leafy, with 1-3 stalkless, lance-shaped leaves. Radical leaves $\frac{1}{6}$-$\frac{1}{2}$ in. long, oval-oblong or oblong-lance-shaped, crowded, soft, white. Flowers small, white, forming a head. Pods elliptic-lance-shaped, once or three times twisted, shorter or broader than in *D. incana*; stalks very short.

Resembles *D. incana* very much, but is more hairy, has a shorter and less leafy stem, and the radical leaves form denser tufts.

Locality.—Alpine region ; Ladakh.

Distribution.—From Kashmir and W. Tibet to Sikkim, 12,000-18,000 ft., Turkestan.

Draba fladnitzensis, Wulf.

A small smooth or hairy plant. Leaves forming dense rosettes, $\frac{1}{6}$-$\frac{1}{2}$ in. long, lance-shaped, the margins with stiff hairs. Flowering stems 1-4 in., erect, leafless or 1-leaved. Flowers white, few, forming a head. Petals short, scarcely clawed. Pods elliptic-oblong, or lance-shaped, straight, smooth. Style very short.

Flowers.—July.

Locality.—Tosh Maidan to Damam Sar, 13,000 ft.

Distribution.—W. Himalaya to Kumaon, W. Tibet.

Draba fladnitzensis, Wulf., var. heterotricha, Hook. f. & T.

The leaves are covered with simple and star-shaped hairs.

Flowers.—July.

Locality.—Damam Sar, 13,200 ft.

Draba tibetica, Hook. f. & T.

A loosely tufted, woolly or hoary plant. Leaves $\frac{1}{4}$-1 in. long, nearly all radical, spoon-shaped-lance-shaped, entire. Flowering stems 3-6 in. high, slender, many, erect, flexuous, usually leafless, rarely with 1 or 2 stalkless lance-shaped leaves. Flowers forming a head, rather large, white; stalks $\frac{1}{2}$-1 in. long, slender, erect. Pods $\frac{1}{6}$-$\frac{1}{3}$ in. long, hoary, shorter than their stalks, elliptic or linear-lance-shaped, flat or twisted. Style variable in length.

Locality.—Zaskar.

Distribution.—Kashmir, W. Tibet, inner ranges of the Sikkim Himalaya, 13,000-15,000 ft.

Draba muralis, Linn. Small Whitlow Grass.

Rootstock slender. An erect, simple or branched, very slender annual or biennial, rough with short, simple or forked hairs. Stems filiform, flexuous, 4-12 in. Radical leaves ¼-½ in., few, forming a rosette, narrowed below, inversely ovate, entire or toothed. Stem-leaves few, broadly egg-shaped, heart-shaped, blunt, coarsely toothed, distant, clasping, hairy. Flowers white, on spreading horizontal stalks, in short racemes, which become longer in fruit. Petals minute, narrow, not notched. Pods smooth, ⅛-½ in. long, flat, blunt, linear to oblong, horizontal, the stalks longer, capillary, spreading. There is no style. Seeds very small, 10-12.

Locality.—At altitudes up to 6,000 ft.

Distribution.—Europe, N. Africa, Asia Minor, Kashmir.

IBERIDELLA, Boiss.

Fig. 4. Iberidella Andersoni, Hook. f. & T.

Stems erect, 2-4 in. high, simple or branched from the base. Flowerless shoots weak, decumbent. Radical leaves short-stalked, tufted, egg-shaped, oblong, indistinctly toothed; stem-leaves oblong, blunt, with small heart-shaped, ear-like lobes. Leaves of the flowerless shoots broadly egg-shaped or almost round, short-stalked. Flowers many, rather large, along an unbranched axis, white or pale rose. Sepals erect, lateral ones bag-shaped at the base. Petals equal. Pods flattened, narrow lance-shaped, curved, pointed, valves without wings. Style very short, tapering from the base.

Flowers.—July.

Locality.—Damam Sar, in damp grassy places.

Distribution.—W. Himalaya from Kashmir to Garhwal and Kumaon, 12,000-16,000 ft.

This is the only Indian species of the genus.

CHRISTOLEA, Camb.

Fig. 5. Christolea crassifolia, Camb.

A much-branched fragile herb, perennial, smooth or hairy; hairs simple. Branches stout, decumbent. Leaves fleshy, wedge-shaped and inversely egg-shaped, pointed or blunt, entire or coarsely toothed towards the tip. Flowers ½ in. diameter, loosely arranged along an unbranched axis; flower-stalks ½ in. long, hairy, erect. Sepals short, lateral ones

slightly bag-shaped at the base. Petals ¼ in. long, yellow with a purple base. Pods linear-lance-shaped, flattened, 1-1½ in. long, erect, pointed at both ends, nearly smooth. Stigma very small. Seeds few, flattened.

Flowers.—July.

Locality.—Lokut Gumber Nar.

Distribution.—W. Tibet, 12,000-15,000 ft.

CHORISPORA, DC.

I. Leaves all radical	...	...	...	*C. sabulosa.*
II. Leaves not all radical	...	...	...	*C. tenella.*

Figs. 6, 7. Chorispora sabulosa, Camb.

A glandular-hairy perennial, 4-5 in. high. Root thick, fleshy, spindle-shaped, branching at the crown. Leaves all radical, tufted, stalked, oblong-lance-shaped, entire, toothed or pinnately lobed, lobes blunt. Racemes arising from among the leaves, dense in the beginning, then getting longer and reaching 6-9 in. Flowers large, yellow or purplish, stalks very slender. Sepals erect, lateral ones bag-shaped at the base. Pods ½-¾ in. long, straight, curved or twisted, showing rounded swellings, beak short, slender; stalks erect, slender, thickened at the top, as long as the pod.

Flowers.—June.

Locality.—Aporwat, above Gulmarg, stony hill-top, above 13,000 ft., not common.

Distribution.—Afghanistan, W. Himalaya from Kashmir to Kunawer, W. Tibet, 10,000-17,000 ft.

Chorispora tenella, DC.

A hairy or rough glandular, rarely smooth annual, 6-9 in. high. Branches many from the base. Leaves short-stalked, oblong-lance-shaped or spoon-shaped, lower ones sometimes pinnately lobed, upper ones entire or toothed. Flowers small, purplish; stalks very short. Racemes much lengthening in fruit. Pods 1½ in. long, slender, curved, not constricted between the seeds, beak long, awl-shaped; stalks ⅙-¼ in. long, spreading, finally as thick as the pod.

Locality.—At altitudes of 5,000-7,000 ft.

Distribution.—Asia Minor, W. Himalaya and Punjab, Salt Range, Central Asia.

Plate 12

MEGACARPAEA, DC.

Megacarpaea polyandra, Benth.

A large, coarse, perennial herb. Root as thick as the wrist, fleshy. Stem 1-2½ ft. high, thick and fleshy, branched above. Leaves radical, twice pinnately divided, a span broad and 1-2 ft. long; segments very irregular, sharply toothed. Inflorescence much branched, hairy. Flowers white, cup-shaped, ⅓ in. diameter, shorter than their stalks. Sepals equal at the base. Petals oblong, entire. Filaments stout, fleshy, awl-shaped. Ovary broadly inversely egg-shaped. Stigma disc-shaped, entire. Pods large, 2 in. diameter, much flattened at the sides; stigma not stalked. Seeds large, kidney-shaped.

Flowers.—June.

Locality.—Aporwat, above Gulmarg, open hill-side amongst low-growing shrubs and rocks, about 11,000 ft. not common; Haramukh.

Distribution.—W. Himalaya from Kashmir to Kumaon, 12,000 ft.

Plate 13

VIOLACEAE. The Violet Family.

VIOLA, Linn. The Violet.

A. Flowers yellow *V. biflora.*
B. Flowers lilac, pale or dark blue.
 I. Flowers less than ¾ in. diameter, leaves not gland-dotted.
 1. Style slender, not inflated above.
 a. Stigma distinctly 3-lobed ... *V. Patrinii.*
 b. Stigma indistinctly 3-lobed... *V. distans.*
 2. Style inflated above.
 a. Sepals blunt at tip *V. odorata.*
 b. Sepals pointed at tip ... *V. sylvatica.*
 II. Flowers ¾ in. diameter, leaves gland-dotted *V. Falconeri.*

Fig. 1. Viola biflora, Linn. Two-flowered Violet, Yellow Violet.

Smooth or hairy. Rootstock slender. Stems 3-12 in. high, usually erect, but also decumbent. Leaves 2 or 3, kidney-shaped, 1-2 in. diameter, crenate; stipules egg-shaped or oblong. Flowers yellow, 1 or 2 on the same stalk. Sepals 5, nearly equal, prolonged downwards in a short, flat, blunt blade. Petals 5, spreading, the lower one streaked with black, its



Megacarpaea polyandra, Benth.

base produced in a very short hollow spur, the other 4 flat. Stamens 5; anthers stalkless, erect. Stigma 2-lobed.

Flowers.—May, June.

Locality.—Gulmarg, damp wood and under big rocks, at 8,000 ft., common; Khelanmarg, 10,000 ft.; Tosh Maidan, on steep rocky hill-side, 9,600 ft.: Basam Gali in Juniper tract, above 10,000 ft.

Distribution.—Europe, Caucasus, temperate Himalaya from Kashmir to Sikkim, 6,000-11,000 ft., N. Asia.

Viola Patrinii, Ging.

Smooth or hairy. Stems none or very short, without runners. Rootstock woody. Leaves very variable, tufted, triangular, egg-shaped, oblong or linear, 1½-4 by ½-1½ in., base heart-shaped or truncate, margin crenate; stalk 2-4 in. long, upper part usually winged. Stipules entire. Flowers ⅓-½ in. diameter, lilac or dark lilac, often scented; stalks sometimes 6 in. long. Style nearly straight, slender. Stigma 3-lobed, hollowed at the top. Fruit a capsule, ¼-½ in. long.

Locality.—At altitudes of 4,000-8,000 ft.

Distribution. — Afghanistan, temperate Himalaya from Kashmir to Bhutan, Khasia Hills, W. Peninsula, Ceylon, N. Asia, Japan.

Viola distans, Wall.

Smooth or almost so. Stems 1-14 in. high, usually long and trailing. Rootstock slender or stout. Leaves ¾-1½ in., very variable, egg-shaped or triangular, heart-shaped, usually pointed, sinus at base broad or narrow. Flowers ⅓-½ in. diameter, pale lilac or blue. Sepals egg-shaped, lance-shaped, blunt. Spur bag-shaped. Style slender. Stigma terminal, indistinctly 3-lobed. Fruit a capsule, linear-oblong, ⅓-½ in. long, containing many seeds.

Locality.—Temperate region.

Distribution. — Temperate Himalaya from Kashmir to Bhutan, 5,000-10,000 ft., Khasia Hills, 4,000-6,000 ft., W. Ghats, in Mysore, the Nilgiris and Pulneys at over 6,000 ft., Ceylon.

Viola odorata, Linn. Sweet Violet.

Rarely more than 6 in. high. The underground stems are thick, scaly, with rooting runners. Stems very short or absent. Leaves tufted, broadly egg-shaped, heart-shaped to kidney-shaped, as broad as long, ½-1 in. diameter, smooth or with a few hairs, blunt at tip, crenate. Stipules broad, lance-shaped, glandular, fringed with hairs, shortly pointed, entire

or toothed. Flowers scented. Sepals oval, blunt at tip. Petals egg-shaped, deep violet inside with a bluish-white base, dark blue outside with a deep violet, short, straight spur. Style inflated above. Stigma bent down. Capsule round, bluntly 3-angled, downy, often purplish.

Locality.—At altitudes of 5,000-6,000 ft.

Distribution.—Europe, N. Africa, N. and W. Asia.

Fig. 2. Viola sylvatica, Fries. Dog Violet.

Flowering stems 2-4 in. high, arising from a short central axis. Rootstock short or absent. Leaves egg-shaped, heart-shaped, blunt at tip, crenate-toothed. Stipules leaf-like, fringed. Sepals short- or long-pointed. Spur straight or hooked. Style inflated above.

Can be distinguished from *Viola odorata* by the pointed sepals.

Flowers.—June.

Locality.—Tanmarg, forest, 7,200-8,700 ft.; above Gulmarg, open hill-sides, above 9,000 ft., common.

Distribution.—From N. Asia to the Atlantic.

Viola Falconeri, Hook. f. & T. Falconer's Violet.

Stem absent or very short. Runners or branches stout, erect, 6-10 in. high. Leaves large, egg-shaped, heart-shaped, crenate. Stipules very large, leaf-like, toothed, densely covered with black glands. Flowers $\frac{3}{4}$ in. diameter. Sepals awl-lance-shaped. Spur bag-shaped.

The large flowers and gland-dotted leaves distinguish this species.

Locality.—Kashmir, apparently endemic.

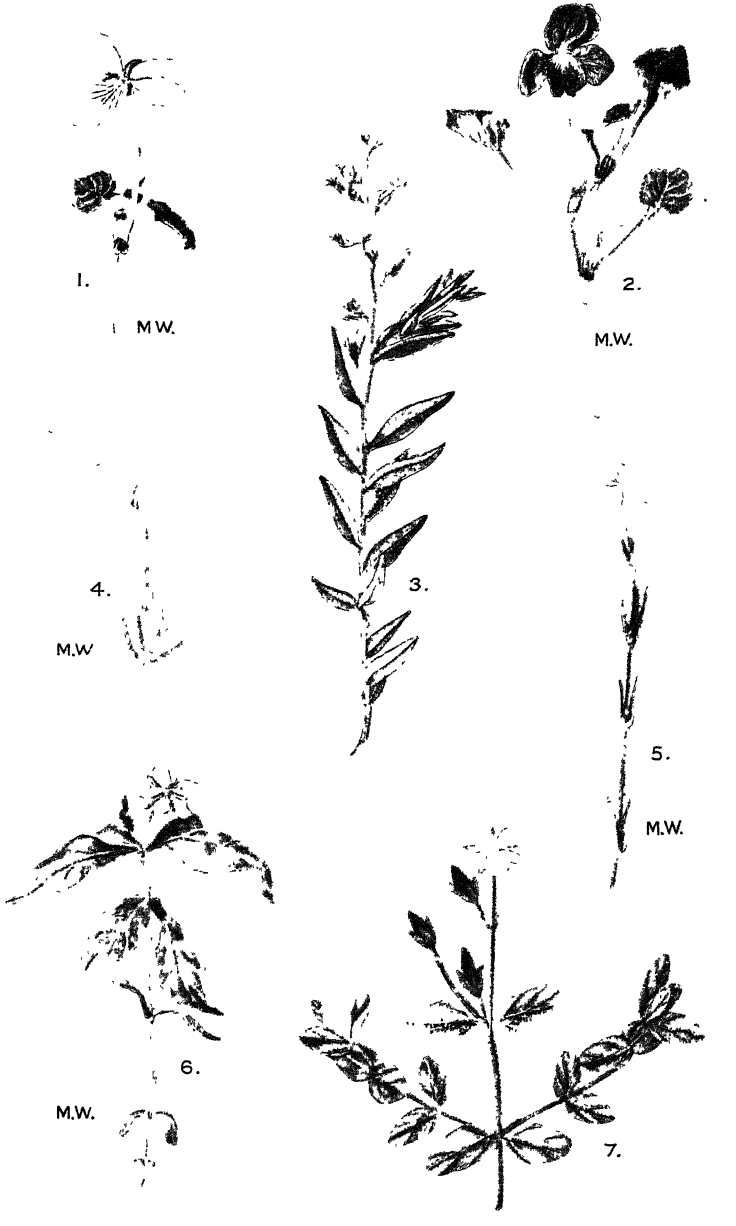
POLYGALACEAE.

POLYGALA, Linn.

I. Flowers blue *P. sibirica.*
II. Flowers purple *P. abyssinica.*
III. Flowers pink.
1. Bracts falling off soon... ... *P. leptalea.*
2. Bracts persistent *P. persicariaefolia.*

Fig. 3. Polygala sibirica, Linn.

Stems many, slender, 3-18 in., hairy. Leaves round to elliptic, lance-shaped and linear, $\frac{1}{2}$-2 in. long, shining margins often bent back. Racemes 1-3 in. long, arising from the axils of leaves or outside the axils, with few or many flowers. Flowers blue. Sepals 5. Outer sepals short or long, blunt or short- or long-pointed, oblong-egg-shaped or lance-shaped.



FIGS.—1, *Viola biflora*, Linn.; 2, *Viola sylvatica*, Fries; 3, *Polygala sibirica*, Linn.; 4, *Dianthus Jacquemontii*, Edgew.; 5, *Dianthus Falconeri*, Edgew.; 6, *Stellaria bulbosa*, Wulf.; 7, *Hypericum Wightianum*, Wall.

The 2 inner sepals (wings) petal-like, obliquely oblong or inversely ovate, blunt or pointed, rarely long-pointed. Petals 3, the lower one keel-shaped and crested; crest usually large. Fruit a capsule, always smooth, broadly winged. Seeds hairy.

This plant is very variable. It is not difficult to recognize it by the shining netted upper surface of the leaves, the slender racemes and large erect flowers.

Flowers.—May.

Locality.—Dachigam.

Distribution.—Temperate and subtropical Himalaya, 1,000-6,000 ft., in Sikkim 8,000 ft., from the N.W. Frontier and the Punjab to Bhutan, Khasia Hills, 4,000-6,000 ft., W. Ghats from the Nilgiris to Tinnevelly, chiefly above 6,000 ft.

Polygala abyssinica, Fresen.

A perennial herb. Stems erect, smooth or hairy. Branches 8-18 in., many, slender, arising from a woody stock. Leaves narrow-linear, long-pointed, $\frac{1}{2}$-$\frac{3}{4}$ in. long, almost stalkless. Racemes at the end of the branches, long, very slender, naked, lax-flowered. Flowers $\frac{1}{4}$ in. diameter. The outer sepals with a membranous margin; the 2 inner sepals (wings) pale grey. Corolla purple, the lower petal crested. Capsule egg-shaped, notched at tip, narrowly winged. Seeds covered with long hairs.

Flowers.—August, September.

Locality.—On open, grassy hill-sides, 3,000-8,000 ft.

Distribution.—Subtropical and temperate Himalaya, from Kashmir to Kumaon, Punjab, Afghanistan, Abyssinia, Natal.

Polygala leptalea, DC.

A perennial herb. Stems erect, smooth, deeply furrowed, 9-18 in. high, simple or branched. Lower leaves often oblong lance-shaped. Racemes 1-2 in. long, tail-like, terminal, naked, dense-flowered. Flowers $\frac{1}{6}$-$\frac{1}{4}$ in. diameter, pink. Wing sepals petal-like, 3-nerved. Bracts falling off immediately after the flowers expand. The 2 inner sepals (wings) narrow, few-veined. Capsule winged. Seeds silky.

Flowers.—May.

Locality.—Gadsar; near Shirazia Bagh, on hill, 5,000 ft.

Distribution.—Subtropical Himalaya, from Kashmir to Nepal, Behar, Khasia Hills up to 4,000 ft., Rangoon, Ava Ganjam, Nilgiris and hills of Coimbatore, Ceylon, Australia.

Polygala persicariaefolia, DC.

An annual hairy herb. Root fibrous. Stems erect, 6-18 in. high, much-branched. Leaves almost stalkless, lance-shaped, 1-2 in. long. Flowers in stalked, erect, usually lateral racemes. Calyx persistent; the 2 inner sepals (wings) pale yellow-grey.

Petals pink, the lower one keel-shaped and crested. Capsule egg-shaped, notched, minutely fringed, narrowly winged near the top. Seeds covered with long hair.

Locality. — Subtropical and temperate regions, 5,000-9,000 ft.

Distribution.—From Kashmir to E. Nepal, Khasia Hills, 2,000-4,000 ft., W. Peninsula from the Deccan to Travancore, about 4,000-5,000 ft., tropical Africa, Australia.

CARYOPHYLLACEAE.

DIANTHUS, Linn. The Pink.

A. Petals not fringed.
 I. Petals smooth, not hairy.
 1. Leaves 1-1½ in.
 a. Leaves not channelled ... *D. Jacquemontii.*
 b. Leaves channelled ... *D. cashemiricus.*
 2. Leaves 3-6 in.
 a. Flowers 1-1½ in. ... *D. caryophyllus.*
 b. Flowers smaller *D. Falconeri.*
 3. Leaves ½-¾ in. *D. anatolicus.*
 II. Surface of petals hairy *D. Segueri.*
B. Petals fringed *D. angulatus.*

Fig. 4. Dianthus Jacquemontii, Edgew. Jacquemont's Pink.

Stems 4-10 in. high, slender, many from a tufted woody stock. Leaves 1-1½ in. long, narrow, leathery, green when dry, flat above, pointed; stem-leaves with thickened margins. Bracts 4, very broad, blunt or pointed, or long-pointed, ¼ the length of the sepals. Flowers usually solitary. Calyx 5-toothed, ¾-1 in. long, teeth rigid and pungent. Petals smooth, broad, deeply toothed, with a long claw. Stamens 10, Styles 2.

Flowers.—August, September.

Locality.—Srinagar and below Gulmarg, dry grassy and stony ground, above 5,500 ft., common; Sind Valley. Apparently endemic.

Dianthus cashemiricus, Edgew.

Stems much branched from the base, erect. Leaves 1-1½ in. long, very narrow, channelled, margin thickened, toothed, mid-rib beneath stout. Bracts 4, lance-shaped, with either very slender points or long leafy ones, sometimes as long as the calyx. Calyx 1 in. long, teeth egg-shaped, lance-shaped, long pointed, margins membranous. Petals large, inversely egg-shaped; blade ½-⅔ by 1 in., margin toothed or almost entire.

This is a more slender plant than *D. Falconeri.*

Locality.—Kashmir. Endemic.

Dianthus caryophyllus, Linn. Wild Carnation, Clove Pink.

An erect perennial herb, 18-24 in. high, smooth, bluish-green, stout, much-branched, leafy below. The barren stems are long, prostrate, then ascending, branched. Leaves 4-6 by $\frac{1}{8}$-in., channelled above, bent-back, with smooth margins, linear. Flowers pink, fragrant, 1-1$\frac{1}{2}$ in. diameter, in loosely panicled cymes. Bracts 4, inversely egg-shaped, blunt-pointed, $\frac{1}{3}$-$\frac{1}{4}$ the length of the calyx-tube. Calyx 1-1$\frac{1}{4}$ in. long, cylindric, obscurely ribbed, teeth not fringed with hairs, longer than the capsule. Petals scalloped, toothed, inversely egg-shaped, smooth, the teeth $\frac{1}{3}$-$\frac{1}{4}$ the length of the blade. Capsule ovoid. Seeds pear-shaped, nearly flat.

Locality.—Baltistan.

Distribution.—Punjab, Kashmir, 7,000-8,000 ft., westward to Europe.

Fig. 5. Dianthus Falconeri, Edgew.

Shrubby below. Stems 1-2 ft. high, stout, rigid, branched. Leaves 3-6 by $\frac{1}{8}$ in., 1-3-nerved, channelled. Flowers usually solitary. Bracts 4, rarely 6, broad-egg-shaped, with a long cusp, three to four times shorter than the calyx. Calyx strongly streaked. Petals pink, finely toothed, smooth, surface not bearded.

The flowers are smaller than in *D. caryophyllus*.

Flowers.—June, July.

Locality.—Ferozepore Nala below Gulmarg, dry stony hill-side, about 7,000 ft., common; Astor.

Distribution.—W. Tibet.

Dianthus anatolicus, Boiss.

A small slender, densely tufted herb; stock woody, much-branched. Stems 6-10 in., 1- or more-flowered. Leaves $\frac{1}{2}$-$\frac{3}{4}$ in. long, very narrow, rigid, slender, mid-rib very thick, margin much thickened, finely toothed. Bracts 6, sometimes 4-8, very broad, long-pointed, sometimes with foliaceous points, $\frac{1}{2}$-$\frac{1}{3}$ shorter than the calyx. Calyx $\frac{1}{3}$ in. Petals rosy, blade small, broad, crenate-toothed, smooth, surface not bearded.

Locality.—Dras, 8,000-10,000 ft.

Distribution.—W. Himalaya, Armenia.

Dianthus Seguieri, Vill.

Stems leafy, erect, 6-10 in. high, simple or branched. Leaves broad-linear, indistinctly 5-nerved. Flowers usually in fascicles. Bracts 4-6, $\frac{1}{2}$-$\frac{2}{3}$ the length of the calyx, with

leafy points or egg-shaped and abruptly long-pointed. Below these bracts usually another set of leafy bracts which are often tipped with a leafy point. Calyx-teeth abruptly pointed by a sharp spine. Petals rosy; blade inversely egg-shaped, sharply toothed, hairy.

Locality.—Ladakh.

Distribution.—Greece, Caucasus, W. Himalaya, Siberia.

Dianthus angulatus, Royle.

Stems many, rigid, erect, 6-10 in. high, 1-flowered. Stock stout, woody, much-branched. Leaves linear, pointed, finely toothed, erect. Bracts 4-6, egg-shaped-long-pointed or the lower with a long cusp, often coloured and varying much as to length from ¼-½ the length of the calyx. Calyx ½-⅔ in. long. Petals fringed for ⅓ the length of the blade.

Locality.—Kishtwar, Zaskar, 7,000-13,000 ft.

Distribution.—W. Himalaya, from Kashmir to Kunawer.

STELLARIA, Linn.

A. Sepals free to the base. Ovary 1-celled. Styles 2-3. Seeds many.
 I. Sepals much shorter than the petals. Styles 2.
 1. Seeds few, large, tubercled ... *S. bulbosa.*
 2. Seeds kidney-shaped, back spiny *S. Webbiana.*
 3. Seeds round, nearly smooth ... *S. latifolia.*
 II. Sepals longer than the petals, or petals 0. Styles 3 *S. media.*

B. Ovary 3-celled. Styles 3. Seeds 1-2 ... *S. crispata.*

C. Sepals free to the base. Ovary 1-celled. Styles 5. Seeds many *S. aquatica.*

D. Sepals more or less united at the base into a tube. Ovary 1-celled. Styles 3. Seeds many.
 I. Plant very hairy near the flowers ... *S. longissima.*
 II. Plant smooth, or margin of leaves hairy towards base.
 1. Petals present.
 a. Sepals as long as the petals *S. graminea.*
 b. Sepals half the length of the petals *S. glauca.*
 c. Sepals longer than the petals *S. uliginosa.*
 2. Petals absent *S. subumbellata.*

E. Sepals united at the broad base. Ovary 1-celled. Styles 3. Seeds few (2-8) ... *S. decumbens.*

Fig. 6. Stellaria bulbosa, Wulf.

Smooth or nearly so. Rootstock slender, creeping, bearing small, globose tubers. Stems slender, simple, 1-5 in. high, erect, with a line of hairs. Leaves few, 2-6 pair, egg-shaped-lance-shaped, ¾-1¾ in. long, rather fleshy, narrowed into a short stalk or stalkless. Flowers 1 or 2, on long, capillary, erect stalks. Sepals 4-5, broadly lance-shaped, ½-⅔ in., shorter than the petals. Petals 4-5, white, egg-shaped-oblong, shortly 2-lobed. Anthers purple. Styles 2, filiform. Capsule 8-angled. Seeds few, large.

The flowers are often dimorphic. In the axils of the lower leaves and from the top of the rootstock small flowers are produced which have no petals but ripen seed.

Flowers.—May, June.

Locality.—Gulmarg, woods, above 8,500 ft., common; Khelanmarg, 10,000 ft.

Distribution.—Temperate Himalaya, Bhutan, Sikkim, 10,000-12,000 ft., Siberia, Corinthia, N. Italy.

Stellaria Webbiana, Wall.

A smooth herb. Stems slender, zigzag, 6-12 in. high, 4-angled, decumbent, branched, leafy. Leaves ½ in. long, spreading, stalkless, linear or with long needle-shaped points, shining, 1-nerved, rather stiff. Flowers axillary, almost erect, white, ½ in. diameter; flower-stalks 1-2 in. long, capillary, upright in fruit. Sepals lance-shaped, long-pointed, shining, ¼ in. long, much shorter than the petals, margins broadly membranous, shining. Petals divided to about the middle, lobes narrow, blunt. Stamens 8. Styles 2. Capsule as long as the sepals, egg-shaped. Seeds kidney-shaped, compressed, pale brown, back prickly.

Locality.—Temperate regions, from 5,000-6,000 ft.; Sonamarg.

Distribution.—W. temperate Himalaya from Kashmir to Kumaon.

Stellaria latifolia, Benth. Broad-leafed Chickweed.

Stems 2-10 in. high, much-branched, 4-angled, smooth below, hairy above, shining except the young, mostly decumbent, often matted. Leaves nearly stalkless, lower ones broadly egg-shaped, almost round, ⅔ in., abruptly narrowed to a sharp point, upper ones lance-shaped, pointed. Flowers ½ in. diameter, white, solitary, long-stalked. Sepals 4, lance-shaped, ¼ in. long, finely pointed, green, with a narrow membranous border, much shorter than the petals. Petals 4, twice as long

as the sepals, divided nearly to the base. Stamens 8. Styles 2. Capsule short, egg-shaped, included in the calyx. Seeds round, brown, nearly smooth.

Flowers.—June.

Locality.—Temperate region, on rocky ground.

Distribution.—W. temperate Himalaya from Kashmir to Kumaon, 6,000-8,000 ft.

Stellaria media, Linn. Common Chickweed.

Smooth or hairy, prostrate, then ascending, 6-24 in. high. Stem and branches have a hairy, alternate, longitudinal line, serving to convey water downward. Leaves smooth, ½-1 in. long, with broad leaf-stalks, fringed with hairs, egg-shaped, short-pointed, the lower leaves stalked, the upper leaves stalkless, often narrower. Flowers numerous, white, in axillary or terminal cymes, the stalks longer than the calyx. Sepals egg-shaped to lance-shaped, ⅛ in. long, glandular, hairy, with a membranous margin, smooth or with long hairs. Petals shorter than the sepals, divided into 2 to the base, sometimes wanting. Stamens 3, 5 or 10. Styles 3. Fruit-stalks wavy, bent back, longer than the leaves or not. Seeds brown, with round tubercles. A very variable plant.

Flowers.—April to October.

Locality.—Temperate regions, in gardens, fields, on road-sides, cultivated and waste ground.

Distribution.—All arctic and N. temperate regions, in the Himalaya up to 14,500 ft.

Stellaria crispata, Wall. Collett, fig. 17.

Stems shining, nearly erect, 2-4 ft. high, 4-angled, hairy at the joints with a line of hairs running down between them, otherwise smooth. Leaves large, stalkless, oblong or linear-oblong, or lance-shaped, usually heart-shaped, long-pointed, margins often crisped. Cymes much-branched, hairy. Sepals ⅙ in. long, lance-shaped, long-pointed, hairy, margin narrowly membranous. Petals shorter or longer than the sepals, white, 2-lobed. Styles 3. Capsule 3-celled. Seeds 1 or 2.

Flowers.—July, August.

Locality.—In forests of temperate regions.

Distribution.—Temperate Himalaya from Kashmir to Sikkim, 5,000-10,000 ft., Khasia Hills, 5,000-6,000 ft.

Stellaria aquatica, Scop. Great Chickweed.

Hairy, upper parts slightly glandular. Stems decumbent, 1-3 ft. high, leafy, slender, brittle. Leaves egg-shaped, heart-shaped, with a long point, the lower stalked, the upper stalkless and hairy along the margin. Flowers large, ½ in. diameter,

white, in the axils of the leaves. Sepals glandular, lance-shaped, about $\frac{1}{6}$ in. at the time of flowering, enlarged in fruit. Petals narrow, divided to the base about $1\frac{1}{2}$ times as long as the calyx. Styles 5. Capsule larger than the calyx, on turned-back stalks and opening by 5 clefts. Seeds reddish-brown and rough, about 60 in each capsule.

Flowers.—May to August.

Locality.—Near Sarbar Lake; Gadsar; near Shirazia Bagh, on hill; Mekhowali, 9,000 ft.

Distribution.—Temperate Himalaya from Kashmir to Nepal, 4,000-9,000 ft., N. and W. Asia, N. Africa, Europe.

Stellaria longissima, Wall.

Stems slender, 6-18 in. high, much-branched, decumbent, laxly tufted, lower parts smooth or slightly hairy, becoming densely silky or almost woolly near the flowers, Leaves $\frac{1}{2}$-$1\frac{1}{4}$ in. long, stalkless, narrowly oblong or lanceolate, pointed, flat, opaque, 1-nerved, spreading or bent back. Flowers $\frac{1}{2}$ in. diameter, white, solitary, or in small cymes. Sepals $\frac{1}{3}$ in. long, narrowly lance-shaped, smooth, with broad membranous margins. Petals as long as the sepals, deeply 2-lobed. Stamens 10. Styles 3. Capsule shorter than the sepals, 5-cleft. Seeds dark brown, very small, tubercled.

Flowers.—June, July.

Locality.—Temperate region.

Distribution.—Temperate Himalaya, 8,000-12,000 ft., from the Punjab to Sikkim.

Stellaria graminea, Linn. Grassy Stitchwort.

A smooth plant, except for the margins of the leaves towards their bases. Stems 1-2 ft. high, slender, almost erect or decumbent and tufted, 4-angled, shining. Leaves stalkless, $\frac{1}{4}$-1 in. long, narrow, linear-oblong, pointed, opaque, margins thickened, often with stiff hairs towards the base. Flowers about $\frac{1}{3}$ in. diameter, white, numerous, borne on spreading forking flower-stalks with leaf-like organs having a membranous margin. Sepals green, shining, blunt or pointed, linear-oblong, 3-nerved, as long as the petals. Petals 2-parted. Stamens 10. Styles 3. Capsule shorter than the sepals. Seeds orange-brown, rough.

Locality.—Mitsahoi.

Distribution.— W. Europe, Afghanistan, W. Himalaya, 11,000-17,000 ft.

Stellaria glauca, Withering.

A smooth perennial herb. Stems 1-2 ft., slender, erect or almost so, 4-angled. Leaves 1-2 in. long, stalkless, oblong or linear-lance-shaped, long-pointed, margins thickened, not

hairy, base rounded, midrib distinct. Flowers ½-¾ in. diameter, white. Flower-stalks 1-3 in. long, rather stout, spreading in fruit. Sepals linear-oblong, or lance-shaped-oblong, pointed or long-pointed, green, 3-nerved, margins broadly membranous, half as long as the petals. Petals 2-lobed, broad. Stamens 10, filaments slender. Capsule broadly egg-shaped, as long as the sepals. Seeds very rough.

Locality.—Indus valley.

Distribution.—W. temperate Himalaya, Siberia, W. Asia, Europe, Greenland.

Stellaria uliginosa, Murr. Bog Stitchwort.

A prostrate or erect perennial, much-branched, very leafy, bluish-green. Stems 6-18 in. high, slender, 4-angled. Leaves egg-shaped, lance-shaped, oblong, pointed, narrowed at both ends, the tip hard, with a few hairs at the base. Flowers few, in cymes. Bracts with a membranous border. Flowers ¼ in. diameter, white. Sepals lance-shaped, pointed, 3-veined. Petals shorter, minute, 2-parted. Stamens 10. Styles 3. Capsule egg-shaped, as long as or slightly longer than the sepals. Seeds very small, tubercled.

Locality.—Wet places of temperate and alpine region, 4,000-10,000 ft.

Distribution. — Temperate and alpine Himalaya from Kashmir to Sikkim (here up to 16,000 ft.), Khasia hills, 5,000-6,000 ft., general in temperate N. hemisphere.

Stellaria subumbellata, Edgew.

Quite smooth. Stems about ½ ft. high, very slender. Leaves ⅓-½ in. long, stalkless, linear or elliptic-oblong, pointed, with thickened margin and tip. Flowers ⅙ in. diameter, white, solitary or in terminal cymes. Flower-stalks ½-1 in. long, capillary, bent down in fruit. Bracts membranous. Sepals egg-shaped-lance-shaped, pointed, green, strongly 3-nerved, with broad membranous margins. Petals absent. Stamens 5. Styles 3, short. Capsule cylindric, ⅙ in. long, twice as long as the sepals, straight. Seeds pale brown, rough.

Locality.—Below glaciers, 11,000-15,000 ft.

Distribution.—Kashmir, Sikkim, Himalaya,12,000-16,000 ft.

Stellaria decumbens, Edgew., var. **polyantha**, Edgew. & Hook. f.

A densely tufted plant, usually very shining. Stems stout. Leaves ¼-½ in. long, egg-shaped or lance-shaped-awl-shaped, hairy. Flowers in cymes, numerous. Sepals 5, oblong-lance-shaped, united at the broad base. Petals minute. Stamens 8-10; filaments broadened at the base. Styles 3. Capsule shorter than the sepals. Seeds 2-8, opaque, nearly smooth, almost round.

Locality.—In rocky and gravelly places of the alpine and subalpine region.

Distribution. — Alpine and subalpine Himalaya, from Kashmir (11,000-15,000 ft.) to Sikkim (18,000 ft.).

HYPERICACEAE.

HYPERICUM, Linn. St. John's Wort.

1. Margins of sepals with gland-tipped teeth *H. Wightianum.*
2. Margins of sepals without glands ... *H. perforatum.*

Fig. 7. Hypericum Wightianum, Wall. Nepalese St. John's Wort.

Stems slender, weak, diffuse or prostrate, cylindric, indistinctly 2-edged, much-branched. Leaves $\frac{1}{4}$-$\frac{3}{4}$ in. long, stalkless or stem-clasping, or with a very short stalk, egg-shaped to lance-shaped, blunt, thin, gland-dotted. Flowers few, yellow, $\frac{1}{3}$ in. Sepals 5, lance-shaped, with gland-tipped teeth. Petals longer than the sepals, without glands or nearly so.

Flowers.—July.

Locality.—At altitudes of 10,000-12,000 ft.; Gangabal.

Distribution. — Temperate Himalaya, from Kashmir to Sikkim (10,000-12,000 ft.), Burma, W. Ghats in the Nilgiris and Pulneys, about 7,000 ft.

Hypericum perforatum, Linn. Perforate St. John's Wort, Amber, Penny John, Rosin Rose.

A perennial herb. Stems 1-2 ft., rounded or slightly angular, many arising from the same root, giving it a clustered appearance, erect, branched above, the branches being opposite, and like the stem 2-edged. Leaves small, stalkless, oblong, with scattered half-transparent dots, perforated. Flowers yellow. Sepals 5, erect, $\frac{1}{4}$ in. long, narrowly lance-shaped, pointed, margins entire, without glands. Petals 5, notched, with black glandular edges. Anthers many, united at the base in 3 distinct bundles, anthers black-dotted. Ovary 3-celled. Styles 3, twice as long as the ovary. Stigmas simple. Capsule $\frac{1}{3}$ in. long, opening from the top by 3 valves. Seeds many, small.

Flowers.—May.

Locality.—Gadsar, abundant on open, dry, grassy ground; near Shirazia Bagh, on hill.

Distribution.—Europe, N. Africa, Siberia, W. Asia, temperate W. Himalaya from Kashmir to Kumaon, 3,000-10,500 ft.

Plate 14

CARYOPHYLLACEAE.

SILENE, Linn.

1. Petals dirty-yellow or brown or brown-purple *S. tenuis.*
2. Petals dirty-red or white ... *S. Moorcroftiana.*
3. Petals white or greenish-white.
 a. Petals not fringed *S. inflata.*
 b. Petals fringed *S. Griffithii.*
4. Petals pink *S. conoidea.*

Fig. 1. Silene tenuis, Willd.

A perennial herb, lower parts smooth, more or less hairy upwards. Stems many from the root, erect or ascending, 6-18 in. high. Leaves chiefly basal, 1-3 in. long, narrow linear or lance-shaped, pointed or long-pointed. Flowers crowded in short terminal racemes or narrow cymes. Calyx bell-shaped, $\frac{1}{8}$-$\frac{1}{2}$ in. long, thin, 10-nerved, teeth spreading. Petals dirty-yellow or brown or brown-purple, limb deeply 2-lobed. Ovary oblong. Capsules egg-shaped. Seeds with 5 rows of tubercles on the back and sides.

Flowers.—July.

Locality.—Aporwat, above Gulmarg, open grassy and rocky hill-side, above 10,000 ft., common; Zoji La.

Distribution.—W. Himalaya, 8,000-12,000 ft., N. and arctic Asia.

Fig. 2. Silene Moorcroftiana, Wall.

A perennial finely hairy plant. Stems many from a woody stock, densely tufted. Flowering branches 6-18 in. long, erect, slender, simple or branched at the top. Radical leaves spoon-shaped to lance-shaped, pointed. Stem-leaves shorter, linear or linear-lance-shaped, long-pointed or blunt. Flowers 1-3 at or near the end of the branches, erect. Calyx 1-1$\frac{1}{4}$ in. long, slender below the middle, nerves 10, dark, teeth short, blunt, with membranous margins. Petals longer than the sepals, 2-parted at tip, dirty-red or white. Capsule egg-shaped. Seeds compressed, not channelled, with 5 rows of tubercles on the back and sides.

Flowers.—July.

Locality.—Above Zoji La, on rocks.

Distribution.—W. Himalaya from Kashmir to Garhwal, 9,000-16,000 ft., Afghanistan.



FIGS.—1, *Silene tenuis*, Willd.; 2, *Silene Moorcroftiana*, Wall.; 3, *Lychnis coronaria*, Lamk.; 4, *Lychnis apetala*, Linn.; 5, *Lychnis indica*, Benth.; 6, *Cucubalus bacciferus*, Linn.

Silene inflata, Sm. Bladder Campion.

A perennial herb, 1-5 ft. high, erect, with no barren prostrate stems, bluish-green except in the axils, smooth or hairy. Radical leaves 1-3 in., egg-shaped, inversely egg-shaped or oblong, or elliptic to lance-shaped, hairless. Stem-leaves stalkless; margins finely toothed. Flowers $\frac{1}{2}$-$\frac{3}{4}$ in. diameter, white or greenish-white, drooping. Calyx inflated, 20-nerved, netted, the mouth narrower than the base, teeth broadly triangular. Petals deeply cleft, with narrow lobes. Anthers purplish-green, tips of filaments and styles purplish. Capsule rounded, conical above. Seeds concave in front, convex on the base, tubercled in lines.

Flowers.—May, June.

Locality.—Tanmarg, forest, 7,200-8,700 ft.; Gadsar; near Shirazia Bagh, on hill.

Distribution.—Europe, N. Africa, temperate Asia, temperate Himalaya from Kashmir to Nepal, 5,000-11,500 ft.

Silene Griffithii, Boiss.

A perennial robust densely hairy plant. Stems 12-18 in. high, simple or branched. Leaves 2-4 by $\frac{3}{4}$-$1\frac{1}{4}$ in., radical ones spoon-shaped-lance-shaped, narrowed into a broad stalk, stem-leaves stalkless, sometimes heart-shaped at the base, more or less hairy on both surfaces. Flowers in opposite, usually 3-flowered cymes. Calyx $\frac{3}{4}$-1 in. long, glandular, teeth not margined with white, nerves 10, green. Petals white, deeply 2-lobed, lobes fringed. Capsule oblong.

Flowers.—June to August.

Locality.—Kishtwar, 7,000-11,000 ft.

Distribution.—W. and C. Asia, W. Himalaya from Kashmir to Garhwal.

Silene conoidea, Linn.

An annual herb, glandular-hairy. Stems erect or ascending, 6-18 in. high, branched. Leaves 2-4 in. long, radical ones spoon-shaped; stem leaves oblong or lance-shaped, pointed, sometimes very narrow, stalkless. Flowers few, erect, in panicles at the end of the branches. Calyx 1 in. long, tubular, finely grooved, narrowed upwards, inflated in fruit, teeth long, linear. Petals pink, small, inversely egg-shaped. Capsule egg-shaped, shining, enclosed in the globose calyx.

Flowers.—May.

Locality.—Srinagar in field on left bank of Jhelum; Zervan, in a field; Gagribal; Saida Kadal, in wheat-field; Ladakh, 8,000-11,000 ft.

Distribution.—S. E. Europe, N. Africa, N. temperate Asia, W. Himalaya from Kashmir to Kumaon, Punjab to Oudh.

LYCHNIS, Linn.

A. Petals with stiff 2-toothed scales at the claw. Capsule 5-valved, valves entire — *L. coronaria.*

B. Petals with membranous scales at the claw. Capsule 4-5-valved, valves entire or 2-lobed.

I. Seeds with a wing — *L. apetala.*

II. Seeds without a wing.

1. Stem 1-flowered — *L. macrorhiza.*

2. Stem few- to many-flowered.

a. Leaves narrow, linear-lance-shaped — *L. Stewartii.*

b. Leaves egg-shaped, elliptic or lance-shaped.

i. Plant not covered with long soft hairs.

A. Flowers white inside, purplish outside ... — *L. indica.*

B. Flowers purple or cream-white.

aa. Calyx bell-shaped ½-¾ in. long ... — *L. fimbriata.*

bb. Calyx globose, ½ in. long — *L. nutans.*

ii. Plant covered with long, soft hairs — *L. pilosa.*

Fig. 3. Lychnis coronaria, Lamk.

A herb, uniformly covered with silky white wool. Stems 1-2½ ft. high, little-branched. Radical leaves spoon-shaped to lance-shaped, 3-5 in. long. Stem-leaves oblong. Flowers on long stalks. Calyx ¾-1 in. long, conical, 10-nerved; teeth twisted to the left. Petals 1 in. long and more, red-purple, broadly inversely heart-shaped, with stiff 2-toothed scales at the claw. Capsule almost stalkless, included in the calyx, consisting of 5 valves, valves quite entire. Seeds bi-convex, striate and warted.

Flowers.—May to August.

Locality.—Gadsar, roadsides and dry places; near Shirazia Bagh, on top of hill in rocky and grassy soil; Dachigam Rakh; below Gulmarg, wooded hill-side, 8,000 ft., common.

Distribution.—S. Europe, W. Asia, Kashmir.

Fig. 4. Lychnis apetala, Linn.

Stems tufted, short, 2-6 in. high, often curved, glandular-hairy, 1-, rarely 2-3-flowered. Radical leaves linear lance-shaped or spoon-shaped, blunt or pointed. Stem-leaves 1-2 pair. Flowers nodding. Calyx $\frac{1}{2}$-$\frac{2}{3}$ in. long, mouth contracted, more open in fruit, membranous, pale between the broad purple-brown nerves. Petals purplish, very variable as to length and breadth, with membranous scales which are almost entire, crenate or lobed. Capsule swollen; valves 2-lobed at tip, erect or bent back. Seeds variable, $\frac{1}{16}$-$\frac{1}{12}$ in. diameter, with a narrow or broad wing.

Flowers.—July.

Locality.—Above Zoji La.

Distribution. — Alpine Himalaya from Kashmir (12,000-17,000 ft.) to Sikkim (up to 18,000 ft.), arctic regions, N. Europe, Asia and America.

Lychnis macrorhiza, Royle.

A small plant, 4-6 in. high. Stem short, simple, 1-flowered. Leaves densely glandular-hairy, inversely egg-shaped to spoon-shaped, pale, blunt or almost pointed. Calyx $\frac{1}{2}$-$\frac{3}{4}$ in. long. Petals apparently deep purple, limb short, 2-lobed. Seeds pale chestnut, kidney-shaped, wingless, minutely rough concentrically, back rounded.

This species resembles *L. apetala*, but the leaves are broader and more densely hairy, and the seeds are wingless.

Locality.—Indus valley, up to 16,000 ft.

Distribution. — Alpine W. Himalaya from Kashmir to Kunawer.

Lychnis Stewartii, Edgew.

Stem short, wiry, 4-6 in. high, slender, hoary below, viscidly hairy above, leafy. Leaves 2 by $\frac{1}{16}$-$\frac{1}{12}$ in., very narrow linear, rigid, with a solitary stout midrib, margins bent back. Flowers few, small, solitary in the upper leaf-axils, nodding. Flower-stalk hairy, with two small linear leaflets (bracts) above the middle. Calyx $\frac{1}{3}$ in. long, hairy, membranous, nerves green, faint, teeth rounded with long curled hairs. Petals inversely heart-shaped, limb 2-lobed, white, claw very broad with ear-shaped little lobes. Capsule longer than the calyx, 10-cleft.

Locality.—On the upper Chenab.

Distribution.—W. Himalaya from Kashmir to Chamba.

Fig. 5. Lychnis indica, Benth. (Including *L. cashemeriana*, Royle.)

A tall branched weak herb, 2-3 ft. high, finely hairy. Stem leafy. Leaves variable, elliptic or egg-shaped to lance-shaped or round, up to 4 in. long, the lower ones stalked. Flowers in glandular-hairy cymes. Calyx ½-¾ in long, inflated, glandular-hairy, nerves 10-15, simple or branched, green or brown, teeth broad, blunt or pointed. Petals variable, with a 2-lobed or fringed limb, usually white inside and purplish outside. Capsule egg-shaped, teeth 5, simple or bifid. Seeds very small, kidney-shaped, very dark, rough.

Flowers.—July.

Locality.—Mekhowali, in forest clearings, 9,000 ft.; Tosh Maidan.

Distribution.—Temperate Himalaya, from Kashmir to Nepal, 5,000-10,000 ft.

Lychnis fimbriata, Wall.

A hairy plant, often glandular-hairy. Stems 2-4 ft. high, much-branched. Leaves variable as to size and shape, egg-shaped, egg-shaped to lance-shaped or narrowly lance-shaped, pointed, the smaller ones 1-2½ by ⅓-1 in., the larger 5 by 1½ in. Flowers erect or nodding, in large panicles. Calyx bell-shaped, ½-¾ in. Petals much longer than the sepals, purple or cream-white, both colours often on the same plant, limb long-fringed, lobes usually 4, each divided into 2 lobes. Styles usually 5.

Flowers.—June.

Locality.—Below Lal Shah ki Alam, 11,000 ft.

Distribution.—Temperate Himalaya, 5,000-10,000 ft.

Lychnis nutans, Benth.

A finely hairy plant, often glandular. Stems much-branched, 2-3 ft. high, weak. Lower leaves lanceolate, about 3 by 1 in. Upper leaves broadly ovate, pointed, about 1½-2½ by 1-1¾ in., sometimes rounded-heart-shaped. Flowers nodding. Calyx ½ in. long, globose, inflated, nerves green or brown, lobes short, rounded. Petals hardly longer than the sepals, purple, limb shortly fringed, segments 4-6, undivided. Seeds kidney-shaped, rough, tubercled on the back.

Flowers.—July, August.

Locality.—Temperate region.

Distribution.—Temperate Himalaya from Kashmir to Kunawer, 7,000-11,000 ft., Murree.

Lychnis pilosa, Edgew.

A hairy herb, covered especially above with long spreading soft hairs. Stem erect or much branched. Leaves egg-shaped or elliptic to lance-shaped. Flowers few, forming a panicle. Calyx up to 1 in. long, oblong, nerves green, lobes short. Petals with a 2-lobed limb, lobes 2-fid. Styles 5. Seeds kidney-shaped, rough on the sides, back with long processes.

Nearly related to *L. nutans*, but the long soft hairs and the long processes on the back of the seeds distinguish it.

Locality.—Temperate region.

Distribution.—W. temperate Himalaya, from Kashmir to Garhwal, 9,000-12,000 ft.

CUCUBALUS, Linn.

Fig. 6. Cucubalus bacciferus, Linn.

A rambling, half-climbing perennial clothed with curly white hairs. Stems 2-3 ft. high, weak, much-branched. Leaves 1-3 by ⅓-1½ in., egg-shaped to lance-shaped, pointed, membranous, lower ones shortly stalked, upper ones stalkless. Flowers drooping, in forked cymes, forming lax leafy panicles. Flower-stalks ⅛-½ in. long. Calyx ⅓-½ in. long, bell-shaped; teeth large, broad, with stiff hairs; nerves indistinct. Petals 5, white, tinged with yellow-green, clawed, limb 2-lobed, with two small scales at its base. Stamens 10. Ovary shortly stalked, globose. Styles 3. Fruit globose, blue-black, nearly ½ in. diameter, in the beginning fleshy, then becoming dry and bursting irregularly. Seeds kidney-shaped, shining.

Flowers.—July.

Locality.—Nil Nag, in forest, 6,900 ft.; Dachigam.

Distribution.—S. Europe, C. Asia, temperate Himalaya from Kashmir (5,000-8,000 ft.) to Sikkim (8,000-12,000 ft.), Khasia Hills.

Plate 15

MALVACEAE. The Mallow Family.

LAVATERA, Linn.

Fig. 1. Lavatera kashmiriana, Camb. The Kashmir Tall Mallow. Coventry pl. XIV.

A tall branching downy herb, 5-8 ft. high. Leaves alternate, covered with short soft hairs, stalked. Lower leaves with stalks as long as the blade, round, heart-shaped, with 5 rounded lobes. Upper leaves with stalks shorter than the blade, 3-5-lobed, central lobe longest. Flowers 2-3 in. diameter, bright pink with darker veins singly in the axils of the leaves. Bracteoles (small leaves immediately below the calyx) 3, sepal-like, broad and sharp-pointed, united at the base. Calyx 5-lobed about half-way down, lance-shaped, longer than the bracteoles. Petals 5, not united, with 2 deep rounded lobes. Stamens many, filaments united. Fruit consisting of a number of small, dry, black, kidney-shaped bodies, each containing 1 seed.

This is the only species. It can be distinguished from species of the genus Malva by the bracteoles being united at the base.

Flowers.—July, August, September.

Locality.—Below Gulmarg amongst low-growing shrubs on stony hill-side, about 7,000 ft., common; Ferozepore Nala below Gulmarg, abundant; Sonamarg; between 7,000 and 9,000 ft.

Distribution.—Kashmir, endemic.

MALVA, Linn. The Mallow.

Fig. 2. Malva silvestris, Linn. Common Mallow, Marsh Mallow, Cheese-flower, Bread-and-Cheese.

A perennial, 1-4 ft. high. Stem tall, erect, strong, woody, branched. Leaves on long stalks, 3-7-lobed, kidney-shaped at the base, lobes radiating from a common centre, the lobes shallow, the margin scalloped, smooth above, roughly hairy below. Bracteoles (small leaves below the calyx) egg-shaped, entire, shorter than the bell-shaped calyx. Corolla 1½ in. diameter, purple, with veins of deeper tint, much longer than the calyx. Flower-stalks slender, spreading. Fruit smooth, netted, with short style. Seeds many, kidney-shaped.

Flowers.—May.

Locality.—Saida Kadal; Dal.

Distribution.—Europe, N. Africa, Siberia, W. temperate Himalaya, from the Punjab and Kashmir to Kumaon.



FIGS.—1, *Lavatera kashmiriana*, Camb.; 2, *Malva silvestris*, Linn.; 3, *Abutilon Avicennae*, Gaertn.; 4, *Hibiscus Trionum*, Linn.

Malva parviflora, Linn. Small-flowered Mallow.

A spreading annual, slightly downy. Stems decumbent, 6-12 in. high. Leaves ½-2 in. across, roundish, obscurely lobed. Flowers small, short-stalked or stalkless. Bracteoles linear. Inner sepals broadly egg-shaped, blunt-pointed. Petals pale-pink, notched, hardly longer than the calyx. Fruit consisting of many, hairy, transversely wrinkled carpels with winged edges.

Flowers.—May.

Locality.—Srinagar, in field on left bank of Jhelum.

Distribution.—Europe, Levant, Nubia, Arabia, N.W. Himalaya, Sind, Punjab, Upper Bengal.

ABUTILON, Gaertn.

Fig. 3. Abutilon Avicennae, Gaertn.

An annual herb, softly hairy. Leaves 3-4 in. long, rounded-heart-shaped with a long point, stalk 3 in. long. Flower-stalks 1 in. long, solitary in the axils of leaves. Sepals 5, free nearly to the base, egg-shaped, pointed. Petals 5, free above, united below, yellow, hardly exceeding the sepals. Stamens many, the lower portion forming a short tube. Fruit consisting of 15-20 bodies, longer than the sepals, oblong, hairy, each with 2 long, horizontal, spreading awns. Seeds shaggy.

Locality.—Professor Hallberg has left no note indicating where he found this species.

Distribution.—S. Europe, N. Asia, N. W. India, Kashmir, Sind, Bengal, N. America.

HIBISCUS, Medik.

Fig. 4. Hibiscus Trionum, Linn.

An annual herb, more or less hairy. Stems 1-2 ft. high. Lower leaves rounded, 1-2 in. diameter, undivided; upper 3-5-lobed, lobes inversely egg-shaped to oblong, blunt, toothed, central one longest. Bracteoles (leaves immediately below the calyx) many, linear. Flowers about 1½ in. diameter, pale yellow with dark purple centre. Calyx bell-shaped, inflated, 5-lobed about half-way down, with hairy green nerves, lobes broad, pointed. Capsules oblong, blunt, hairy. Seeds rounded on the back, dotted with small stellate hairs.

Flowers.—June.

Locality.—Srinagar.

Distribution.—S. Europe, tropics of the Old World, W. Himalaya up to 6,000 ft.

Plate 16

GERANIACEAE. The Crane's-bill Family.

GERANIUM, Linn. The Crane's-bill.

A. Flowers large, 1 in. and more in diameter.

I. Leaves 3-5-lobed. Flowers blue-purple to red-purple *G. Wallichianum.*

II. Leaves 5-7-lobed.

1. Leaves 7-lobed, 5-angled ... *G. rectum.*
2. Leaves 5-7-lobed.
 - *a.* Leaves rounded, not angular *G. collinum.*
 - *b.* Leaves 5-angled. Flowers rose-coloured *G. Grevilleanum.*

III. Leaves 7-9-lobed. Flowers bluish-purple *G. pratense.*

B. Flowers less than 1 in. diameter.

I. Flower-stalks 2-flowered, solitary in the axils of leaves or at end of branches. Flower-buds oblong or egg-shaped, not pyramidal.

1. Petals entire *G. nepalense.*
2. Petals notched *G. sibiricum.*

II. Flower-stalks 2- or more-flowered, crowded. Flower-bud oblong or egg-shaped, not pyramidal.

1. Fruiting stalks not bent down *G. tuberaria.*
2. Fruiting stalks bent down.
 - *a.* Carpels not wrinkled.
 - i. Seeds smooth ... *G. pusillum.*
 - ii. Seeds deeply pitted *G. rotundifolium.*
 - *b.* Carpels wrinkled ... *G. molle.*

III. Flower-stalks 2-flowered. Flower-buds pyramidal.

1. Flowers streaked with dark and light red *G. Robertianum.*
2. Flowers rose-red *G. lucidum.*
3. Flowers rose-coloured with a dark purple eye... ... *G. ocellatum.*



FIGS.—1, *Geranium Wallichianum*, Sw.; 2, *Geranium collinum*, M. Bieb.; 3, *Geranium rectum*, Trautv.; 4, *Geranium pratense*, Linn.; 5, *Geranium Robertianum*, Linn.; 6, *Oxalis acetosella*, Linn.

Fig. 1. Geranium Wallichianum, Sw. Wallich's Crane's-bill. Coventry pl. XV.

A perennial, hairy plant. Rootstock thick. Stems robust, 1-4 ft. high, erect, much-branched. Leaves rounded, 2-5 in. across, palmately 3-5-lobed; segments wedge-shaped, pointed, sharply and irregularly toothed. Stalks long, opposite. Stipules (leaflets at the base of the leaves) one on each side of the stem between the bases of two leaf-stalks, large, ½-1 in. long, oblong-egg-shaped. Flowers 1½-2 in. diameter, blue-purple to red-purple with darker red veins, borne on long stalks, each stalk bearing usually 2-stalked flowers with mostly 4 bracts at the point from which the flower-stalks arise. Sepals 5, abruptly long-pointed. Petals 5, free, slightly notched, claw hairy. Filaments of anthers suddenly broadened at the base. Carpels covered with long hairs. Seeds smooth.

This species can easily be distinguished by the large solitary stipules. It resembles *G. pratense* which, however, has 7-9-lobed leaves and linear-lanceolate stipules.

Flowers.—May to September.

Locality.—At heights of 7,000-11,000 ft.; Gadsar, common; Dachigam Rakh; towards top of Hayan Pass, 9,000 ft., and above; Gulmarg, common.

Distribution.—Temperate Himalaya, from Kashmir to Nepal.

Fig. 2. Geranium collinum, M. Bieb.

Stems usually short, hairy or glandular-hairy, ½-1 ft. high. Leaves rounded, 5-7-lobed to below the middle, segments wedge-shaped, bluntly 3-5-lobed, lobes often slender. Stipules (leaflets at base of leaf-stalks) small, egg-shaped. Flowers small; stalks slender. Sepals shortly awned. Filaments with stiff hairs at the base.

Locality.—Zaskar; Dachigam Rakh.

Distribution.—Afghanistan, W. Himalaya from Kashmir to Sikkim, Siberia, S. Russia.

Fig. 3. Geranium rectum, Trautv.

Stem about 2 ft. high, slender, sparingly leafy and hairy. Leaves opposite, 3-4 in. diameter, 5-angled, 7-lobed to below the middle; sparingly hairy on both surfaces, segments rhomboid, sharp-pointed and sharply cut. Stalks of radical leaves very long and slender. Stipules (small leaves at base of leaf-stalk) awl-shaped to lance-shaped. Flower-stalks sometimes 8 in. long. Flowers 1¼ in. diameter. Sepals membranous, narrow, oblong, with a stout, long awn. Petals inversely egg-shaped, spreading, notched, with stiff hairs at

the very base. Filaments gradually getting narrower upwards, with stiff hairs. Carpels slightly hairy. Seeds smooth.

Flowers.—June.

Locality.—Gulmarg, woods and hillsides, 7,000-9,000 ft. common.

Distribution.—Kashmir, Soongaria.

Geranium Grevilleanum, Wall. Greville's Crane's-bill.

A tall, branched herb, robust or slender, hairy and glandular. Leaves pentagonal, 5-7-lobed, below the middle segments rhomboid, pointed or long-pointed, cut. Stipules (leaflets at the base of the leaves) 2-lobed or in pairs, egg-shaped and long-pointed. Flower-stalk slender, covered with spreading glandular hairs. Bracts (small leaves at base of flower-stalks) linear, slender. Flowers 1-1½ in. diameter. Sepals long-awned. Petals inversely egg-shaped, tip rounded or slightly depressed, rose-coloured, hairy at the base. Stamens 10; filaments gradually getting narrower upwards, covered with long hairs. Fruit hairy. Seeds smooth.

This species resembles *G. Wallichianum*. It can easily be distinguished by the 2-lobed stipules and very hairy filaments.

Flowers.—June.

Locality.—Tosh Maidan.

Distribution. — Temperate Himalaya, from Kashmir to Sikkim, 8,000-11,000 ft.

Fig. 4. Geranium pratense, Linn. Meadow Crane's-bill.

Stem 2-4 ft. high, erect, stout, branched, hairs spreading. Leaves stalked, 2-3 in. diameter, rounded, 7-9-parted, segments sharply cut. Stipules awl-shaped to lance-shaped. Flower-stalks 2-flowered, bent back in fruit. Flowers large, 1-2 in. diameter, bluish-purple, veined. Petals long, spreading, inversely egg-shaped, entire or notched, the claw or stalk fringed with hairs, or bearded. Sepals long-awned, spreading. Filaments slender, wedge-shaped below, hairless or hairy at the base. Carpels smooth, glandular to hairy, the hairs spreading. Seeds minutely netted.

The flowers vary considerably in colour from almost red to blue.

Flowers.—June.

Locality.—Above Gulmarg, open hillside, above 10,000 ft., common.

Distribution.—Europe, N. Asia, W. temperate Himalaya.

Geranium nepalense, Sw. Nepalese Crane's-bill.
Collett, fig. 22.

A slender prostrate much-branched herb, 6-18 in. high, hairy, without glands; branches often rooting at the joints. Leaves 1½-3 in. across, palmately 3-5-lobed; segments equal or nearly so, irregularly lobed and toothed. Stipules (leaflets at the base of the leaves) narrowly lanceolate, ½ in. long. Flower-stalks usually slender, sometimes 1-flowered, variable in length, spreading, bent back after flowering. Flowers ½-⅝ in. diameter, pink or purple or pale-purple. Sepals shortly pointed, usually silky. Petals slightly notched. Carpels hairy. Seeds smooth, shining.

Flowers.—May to September.

Locality.—Along Hayan-Kangan Road on hard dry ground; Harwan; Dachigam; Magam, hanging from sides of ditches; Dal Kutwal.

Distribution.—All over the temperate Himalaya, 5,000-9,000 ft.; Khasia Hills, Nilgiris and Pulney Hills, usually above 6,000 ft.; China, Japan.

Geranium sibiricum, Linn. Siberian Crane's-bill.

A prostrate, slender, much-branched, hoary herb. Leaves 5-gonal, 5-parted; segments rhomboid, pointed, sharply incised; upper leaves all stalked. Stipules (leaflets at base of leaf-stalks) awl-shaped. Flower-stalks slender, 1-2 flowered. Sepals with a long awn, as long as or longer than the petals. Petals notched.

Locality.—Ladakh, 10,000-12,000 ft.

Distribution.—Kashmir, Siberia, Dahuria, Caucasus.

Geranium tuberaria, Camb.

Rootstock tuberous. Flowering stems 12-18 in. high, slender, simple or branched, hairy and glandular. Leaves 1½-3 in. diameter, rounded, kidney-shaped, 5-7-parted, segments pinnately divided; stalks long, slender; stipules variable. Flower-stalks 2-flowered, forming an umbel or fascicle, clothed with long spreading glandular hairs. Flowers 1 in. diameter. Sepals elliptic, small, blunt, awned, very hairy. Petals large, inversely heart-shaped, with stiff hairs at the very base. Filaments very slender throughout their length, with very long hairs. Fruit 1¼-1½ in. long, erect, hairy; carpels smooth, their beaks remaining attached to the axis.

Locality.—Kishtwar, 8,000 ft.

Distribution.—Temperate W. Himalaya.

Geranium pusillum, Linn. Small Crane's-bill.

A prostrate, then erect herb, or with a semi-rosette habit. Stem spreading, much-branched, leafy, downy, the down soft and short. Leaves ½-1 in. diameter, kidney-shaped to rounded, with 5-9 lobes radiating from a common centre, each lobe divided into 3. Stipules short. Flowers ¼ in. diameter, blue-purple or pale-rose, numerous; flower-stalks in the axils shorter than the leaves. Sepals blunt or pointed. Petals inversely heart-shaped, scarcely exceeding the sepals, the claw fringed with hairs. Perfect stamens often only 5. Style pale flesh-colour. Fruit ⅛ in. long. Carpels not wrinkled, hairy.

Flowers.—May.

Locality.—Srinagar, in field on left bank of Jhelum; Saida Kadal in wheat-fields; Kishtwar, 8,000 ft.

Distribution.—Europe, Syria, W. temperate Himalaya.

Geranium rotundifolium, Linn. Round-leaved Crane's-bill.

Erect or spreading, very slender, loosely hairy. Leaves ½-1½ in. diameter, kidney-shaped, 7-lobed, segments broad, bluntly lobed. Flowers ⅛ in. diameter. Sepals with a short awn. Petals longer than the sepals, entire, narrow, spoon-shaped, pale-pink, claw smooth. Fruit ⅜ in. long; carpels keeled, not wrinkled. Seeds dotted.

Locality.—In the temperate regions, 6,000-9,000 ft.

Distribution.—Europe, N. Africa, Siberia, Punjab, W. temperate Himalaya, from Kashmir to Garhwal.

Geranium molle, Linn. Dove's-foot.

A herb 6-12 in. high, softly downy, glandular above. Stems rather stout, spreading. Leaves rounded to kidney-shaped with 7-9 lobes which are contiguous, wedge-shaped, deep, scalloped, trifid at the tip. Radical leaves long-stalked. Stipules (leaflets at base of leaf-stalks) egg-shaped. Flowers small, purple or white, with lilac claws, fringed with hairs, inversely heart-shaped, longer than the sepals. Sepals blunt-pointed. Flower-stalks in the axils of leaves. Filaments smooth. Carpels persistent, transversely wrinkled, keeled, smooth. Seeds smooth.

Easily distinguished from the two preceding species by the wrinkled carpels and smooth filaments.

Locality.—Kishtwar, 6,000-9,000 ft.

Distribution.—Europe, N. Africa, temperate W. Himalaya, from Kashmir to Kumaon.

Fig. 5. Geranium Robertianum, Linn. Herb Robert, Bird's-eye, Stork's-bill, Cuckoo's-eyes.

Annual or biennial, up to 2 ft. high, softly hairy, usually glandular and strongly scented, straggling, spreading, shining, viscous red, with swollen nodes. Leaves opposite, 1-3 in. broad, 3-5-parted, with lobes divided into 3 parts nearly to the midrib, the segments having a small terminal red spine, leaf-stalk long; stipules paired at the nodes. Flowers ½ in. diameter, streaked red and white. Flower-stalks 2-flowered. Sepals long-awned. Petals entire, narrow, claw not hairy. Fruit ¾-1 in. long, transversely wrinkled, keeled. Seeds punctulate.

Flowers.—June.

Locality.—Along Hayan-Kangan Road; Sind Valley.

Distribution.—Europe, N. Africa, Asia Minor, Caucasus, W. temperate Himalaya, 6,000-8,000 ft., from Kashmir to Garhwal, Siberia.

Geranium lucidum, Linn. Shining Crane's-bill.

A brittle and succulent plant. Stem hairless, shining, spreading, tinged with red. The upper branches have two lines of hairs. Leaves rounded, kidney-shaped, 5-lobed, the segments scalloped, bent, blunt-pointed. Leaf-stalk long, but shorter than the flower-stalk. Stipules egg-shaped, sharp-pointed. Flowers rose-colour, ⅛-½ in. diameter. Calyx wrinkled, pyramidal. Petals inversely egg-shaped, entire, claw hairless. Fruit ½ in. long, hairless, beak very slender. Carpels small, separating both from their beak and the axis, wrinkled, keeled, netted. Seeds smooth.

Locality.—Kishtwar.

Distribution.—Europe, N. Africa, Syria, Caucasus, Siberia, temperate W. Himalaya, from Kashmir to Kumaon, 6,000-9,000 ft.

Geranium ocellatum, Camb.

A small, hairy annual. Stems prostrate or diffuse, 12-18 in. high. Leaves rounded, ½-2 in. diameter, palmately 5-7-lobed; segments 3-lobed, toothed. Flowers ¾ in. diameter. Sepals long-pointed, rigid after flowering, wrinkled from pressure against the carpels. Petals inversely heart-shaped, much larger than the sepals, pink, with dark purple base, forming an almost black spot in the centre of the flower. Fruit ⅜ in. long, erect, carpel corrugated. Seeds shining, pale.

Flowers.—April, May.

Locality.—Temperate and sub-tropical regions, 1,000-6,000 ft.

Distribution.—Hilly districts of N. India, from the Punjab and Kashmir to Nepal, Salt Range, Behar.

OXALIDACEAE.

OXALIS, Linn. The Sorrel.

1. Flowers white or pale pink ... *O. acetosella.*
2. Flowers yellow *O. corniculata.*

Fig. 6. **Oxalis acetosella, Linn.** Wood sorrel, Lady's clover, Sheep sorrel, Sour clover, Sleeping Beauty.

A delicate, pretty, bulbous plant without an aerial stem, hairy. Leaves all radical, 1-2 in. diameter, consisting of 3 stalkless leaflets. Leaflets inversely egg-shaped, faintly notched at tip, lower surface often purple. Flowering stem longer than the leaves, with 2 bracts or leaf-like organs about the middle, 1-flowered. Flowers white with purple veins, or pale pink. Petals 5, 3-4 times as long as the calyx. Fruit a capsule, $\frac{1}{3}$ in. long, egg-shaped. Seeds 2 or 3 in each cell.

Flowers.—May, June.

Locality.—Gulmarg, woods, above 8,500 ft., common.

Distribution.—N. temperate regions, N. Africa, N. and W. Asia, temperate Himalaya, from Kashmir to Sikkim, 8,000-12,000 ft.

Oxalis corniculata, Linn. Yellow Oxalis.

Annual or perennial, hairy. Stems branched, procumbent, 6-18 in. high, rooting at the nodes. Leaves alternate, $\frac{1}{2}$-1 in. diameter, consisting of 3 leaflets. Leaflets inversely heart-shaped, pale green. Flowers small, yellow. Flower-stalks in the axils of the leaves, 2-flowered, in a sort of umbel, not so long as the leaves; the fruit-stalks turned back. Petals twice as long as the calyx. Capsules downy, cylindrical, $\frac{1}{2}$-1 in. long, tipped with the persistent style. Seeds several in each cell, transversely ribbed.

Flowers.—May.

Locality.—Below Tanmarg, on very stony ground.

Distribution.—Nearly all regions, throughout the warmer parts of India and Ceylon, in the Himalayas up to 8,000 ft.

Plate 17.

BALSAMINACEAE.

IMPATIENS, Linn. Balsam.

A. Flowers pink, purple or crimson.
 I. Flowers in racemes or umbel-like clusters, often in panicles. Capsule hairless.
 1. Leaves stalked.
 a. Flowers 1-1½ in. long, excluding the spur.
 i. Capsule linear.
 A. Stems 4-10 ft. Leaves opposite or whorled, rarely alternate ... *I. sulcata.*
 B. Stems 1-3 ft. Leaves alternate *I. amphorata.*
 ii. Capsule club-shaped, thick at the tip *I. Roylei.*
 b. Flowers ½-¾ in. long, excluding the spur *I. Thomsoni.*
 2. Leaves stalkless, stem-clasping *I. amplexicaule.*
 II. Flowers solitary in the axils of leaves. Capsule hairy *I. balsamina.*
B. Flowers golden yellow *I. scabrida.*
C. Flowers many-coloured; standard white, rose-tinged, keel red, basal lobes of wings pale yellow, terminal bright rose *I. Balfourii.*
D. Flowers large, yellow and red *I. Edgeworthii.*
E. Flowers white *I. brachycentra.*

The plants illustrated are described first, the others follow in alphabetical order.

Fig. 1. Impatiens sulcata, Wall. Grooved Balsam.

A hairless herb. Stems 4-10 ft. high, stout, erect, grooved. Leaves usually opposite or whorled, stalked, egg-shaped to lance-shaped, 3-7 in. long, coarsely toothed or crenate, long-pointed, a small, bristle-like gland on the upper side of each crenature. Flowers pink, purple or dark crimson, 1-1½ in. long, excluding the spur, in terminal, umbel-like, often paniculate clusters. Lip darker, spotted, broadly funnel-shaped, suddenly contracted into a nearly cylindric, curved spur about ⅓ in. long. Standard keeled at the back. Wings orange-streaked. Capsule linear, 1¼ in. long. horizontal.

Flowers.—June.

Locality.—Below Nagmarg.

Distribution.—Temperate Himalaya, 7,000-12,000 ft.

Fig. 2. Impatiens Roylei, Walp. Royle's Balsam.

A hairless herb. Stems 3-6 ft. high, sometimes more, as thick as the thumb, fleshy, sometimes red. Leaves opposite or whorled, rarely alternate, stalked, lance-shaped, 2½-6 in. long, usually sharply and regularly toothed, long-pointed, teeth gland-tipped. Flowers pale pink or dark crimson, sometimes white, 1¼-1½ in. long, excluding the spur, forming racemes or umbel-like clusters at the end of the branches, sometimes panicles. Lip spotted with yellow, broadly bell-shaped, suddenly contracted into a cylindric, curved, rather thick, yellow spur, about ¼ in. long. Capsule club-shaped, 1 by ¼ in., thickest at tip, usually drooping.

Flowers.—June to August.

Locality.—Khanapur, along rivulet on damp bank, 6,500 ft.; near Kadalbal Bridge, 9,350 ft.; Gulmarg, nalas and edge of woods, 6,000-9,000 ft., common.

Distribution.—W. temperate Himalaya, from Kashmir to Nepal, 6,000-9,500 ft.

Fig. 3. Impatiens Balfourii, Hook, f. Balfour's Balsam.

A perfectly hairless branching herb, 2-3 ft. high; branches bluntly angled. Leaves 3-5 in. long, shortly stalked, egg-lance-shaped, almost long-pointed, teeth very small, bent back, basal teeth longer and straighter, without glands, base of leaves wedge-shaped or rounded, pale green above, with 8-10 nerves on each side of the midrib; leaf-stalk without glands. Stalks of racemes loosely crowded in the uppermost leaf-axils, forming a nearly umbellate cluster, 3-4 in. long, very slender. Racemes very short, simple, 6-8-flowered. Bracts about ⅛ in. long, egg-lance-shaped. Flower-stalks very slender, ½-1 in. long. Sepals 2, nearly round, with a sharp point, about ⅛ in. broad. Standard round, reflexed, white, suffused with rose; keel red, slightly thickened. Wings 1-1¼ in. long, basal lobe oblong, pale yellow, end-lobe much larger, broadly hatchet-shaped, bright rose, tip rounded. Lip 1 in. to 1½ in. long, bell-shaped, somewhat bent inwards, horn obtuse, with a thickened tip. Capsules erect, linear, 1-1½ in. long, 5-angled, the angles red, few-seeded. Seeds oblong, outer coat thick, covered with very small points.

Flowers.—June.

Locality.—Ganderbal.

Distribution.—W. Himalaya.

Fig. 4. Impatiens Edgeworthii, Hook, f. Edgeworth's Balsam.

A tall, robust, branched, hairless herb, 10 in. to 2½ ft. high. Leaves large, stalked, elliptic to long-pointed, sharply serrate, the serratures tipped with glandular bristles. Flowers 1 in.



FIGS.—1, *Impatiens sulcata*, Wall.; 2, *Impatiens Roylei*, Walp.; 3, *Impatiens Balfourii*, Hook. f.; 4, *Impatiens Edgeworthii*, Hook. f.; 5, *Impatiens Thomsoni*, Hook. f.; 6, *Impatiens Thomsoni*, Hook. f.; 7, *Impatiens brachy-*

long from the tip of the standard to the spur, yellow, streaked with red, forming short racemes. Sepals very large, green, rounded, midrib crested. Standard rounded with a green crest. Lip funnel-shaped, narrowed into an inwards-bent spur. Capsule linear, erect, not club-shaped. Seeds few, oblong, compressed.

Flowers.—July.

Locality.—Below Gulmarg, damp watercourses and woods, above 8,000 ft., common.

Distribution.—W. temperate Himalaya.

Figs. 5 and 6. Impatiens Thomsoni, Hook, f. Thomson's Balsam.

A tall, robust, branched, hairless herb. Stems 1-4 ft. high. Leaves opposite below, whorled or alternate above, stalked, lance-shaped, 2-6 in. long, long-pointed, sharply toothed or crenate, a small bristle-like gland between the teeth or crenatures. Flowers pale pink or whitish, $\frac{1}{2}$-$\frac{3}{4}$ in. long excluding the spur, forming umbel-like clusters, sometimes panicles at the end of the branches. Lip spotted with brown or yellow, funnel-shaped, gradually narrowed into a slender, tapering spur, about $\frac{1}{2}$ in. long. Capsule club-shaped, about $\frac{3}{4}$ by $\frac{1}{5}$ in., irregularly swollen, tapering to the base.

Flowers.—June, July.

Locality.—Near Shirazia Bagh, on hill; along path to Hayan Pass, 9,700 ft.; Gulmarg, shady, damp hill-sides, about 8,000 ft.; Gangabal.

Distribution.—Temperate Himalaya, from Kashmir to Sikkim, up to 12,000 ft.

Fig. 7. Impatiens brachycentra, Kar. & Kir.

An erect, annual, slender, branched herb. Stems $\frac{1}{2}$-2 ft. high, usually naked below, not winged. Leaves 2-5 in. long, very membranous, alternate, long-stalked, egg-shaped to lance-shaped, crenate, the crenatures gland-tipped. Flowers white, $\frac{1}{4}$ in. long including the spur, forming racemes or umbel-like clusters usually in the axils of the upper leaves. Lip boat-shaped with a very short, straight, conical spur, or spur absent. Capsule $\frac{1}{2}$-$\frac{2}{3}$ in. long, narrowly oblong, membranous, hairless. Seeds few, pear-shaped, compressed, slightly wrinkled.

Flowers.—May to July.

Locality.—Below Tanmarg on very stony ground; Dachigam Rakh; Magam; Gulmarg, woods, about 8,000 ft., common.

Distribution.—W. temperate Himalaya, from Kashmir to Garhwal, 7,000-12,000 ft.; Soongaria.

Impatiens amphorata, Edgew.

A hairless herb. Stems 1-3 ft. high, erect, branched, slender or robust. Leaves usually alternate, stalked, 3-6 in. long, lanceolate, crenate, a small, bristle-like gland on the upper side of each crenature. Flowers purple, 1-1¼ in. long excluding the spur, forming racemes or umbel-like clusters, often panicles. Lip darker spotted, broadly funnel-shaped, narrowed into a slender, cylindric, inwards-bent spur ⅓ in. long. Standard keeled at the back, tip crested. Wings usually white on the lower half. Capsule linear, 1-1½ in. long, rounded, erect, not at all club-shaped. Seeds few, large, oblong, compressed.

Flowers.—September.

Locality.—Temperate region.

Distribution.—W. temperate Himalaya, from Kashmir to Kumaon, 5,000-8,000 ft.

Impatiens amplexicaule, Edgew.

A tall, branched, hairless herb. Stem 1-3 ft. high, 4-angled. Leaves stalkless, stem-clasping, lower ones opposite, oblong-lance-shaped, upper ones alternate, egg-shaped to lance-shaped, 3-7 in. long, long-pointed, all crenate; crenatures gland-tipped. Flowers purple, ¾-1 in. long excluding the spur, forming umbel-like clusters or racemes in the axils of the leaves. Standard rounded, 2-lobed; wings 2-lobed; lip funnel-shaped, suddenly narrowed into a cylindric usually nearly straight spur about ⅓ in. long. Capsule oblong, slender, ¾-1 in. long.

This species can easily be made out by the alternate, stem-clasping upper leaves.

Flowers.—July.

Locality.—Temperate region.

Distribution.—W. temperate Himalaya, from Kashmir to Kumaon, 6,000-12,000 ft.

Impatiens balsamina, Linn. Common Balsam.

An annual hairy herb. Stem 6-18 in. high. Leaves alternate, rather distant, shortly stalked or stalkless, narrow-lance-shaped, long-pointed, 1½-2½ in. long, deeply toothed, with glandular stalks. Flowers purple or pink or nearly white, ½ in. long excluding the spur, solitary or clustered in the axils of leaves. Standard tipped with a small green point. Lip small. Spur about ½ in. long more or less, slender, cylindric, curved inwards. Capsule hairy, egg-shaped, ⅓-½ in. long.

The origin of the common garden balsam.

Flowers.—August.

Locality.—Subtropical region.

Distribution.—Tropical and subtropical India and Ceylon, Malay Islands, China.

Impatiens scabrida, DC. Collett, fig. 23.

A robust, often much-branched, rarely quite hairless plant. Stems 2-5 ft. high. Leaves 2-6 in. long, alternate, stalkless or nearly so, egg-shaped or lance-shaped, sharply toothed; teeth gland-tipped. Flower-stalks 2- to 6-flowered, short, 1-2 in. long. Flowers golden-yellow, spotted with brown, 1¼-1½ in. long excluding the spur. Lip broadly funnel-shaped, suddenly contracted into a slender, cylindric, inwards-bent spur ½ in. long. Standard with a green, horn-like outgrowth on the back. Capsule 1-2 in., slender, straight, ribbed, hairy or hairless.

Flowers.—July, August.

Locality.—Temperate region.

Distribution.—Temperate Himalaya, from Kashmir to Bhutan, 6,000-10,000 ft.

Plate 18.

RUTACEAE. The Orange Family.

DICTAMNUS, Linn.

Fig. 1. **Dictamnus albus**, Linn. False Dittany, Burning Bush. Coventry pl. XVI.

A strong-smelling herb, shrubby below, clothed with raised glands. Stems stout, but not woody, branched, 1-3 ft. high. Leaves 6-12 in. long, odd-pinnate, gland-dotted; stalk very stout, angular; leaflets 9-15, stalkless, dark green, base wedge-shaped. Flowers showy, 1-1½ in. long, white striped with pink, or sometimes white or pinkish, forming an erect, terminal raceme up to 1 ft. long and more. Flower-stalks stout, glandular. Sepals 5, narrowly lance-shaped, glandular, persistent. Petals 5, much longer than the sepals, lance-shaped, spreading. Stamens 10, as long as the petals, hairy, glandular, bristle-tipped, protruding downwards in a curved bunch. Ovary nearly stalkless, egg-shaped, deeply 5-lobed, rough with glandular hairs. Style long, simple. Fruit a hard, almost woody capsule, 1 inch diameter, deeply divided into 5 almost distinct segments, the segments beaked, splitting open at the top, each containing 2 or 3 seeds.

Flowers.—June.

Locality.—Ferozepore Nala below Gulmarg, on steep, rocky side of nala, about 7,000 ft.; Gurez.

Distribution.—Temperate W. Himalaya, from Kashmir to Kunawer, 6,000-8,000 ft., Japan, Siberia, Dahuria, westward to France and Spain.

SKIMMIA, Thunb.

Fig. 2. Skimmia laureola, Sieb. & Zucc.
Kashmiri name: Ner.

A hairless shrub, 3-8 ft. high, strongly aromatic, sweet-scented, evergreen. Leaves 3-6 in. long, alternate, oblong-lance-shaped, entire, short-stalked, gland-dotted, crowded near the end of branches. Flowers about ½ in. diameter, yellow or greenish-yellow or white, 1- to 2-sexual, forming crowded terminal panicles 1½-2 in. long. Calyx 5-lobed, persistent. Petals oblong, much longer than the calyx. Stamens 5, absent in the female flower, filaments as long as the petals. Ovary egg-shaped, rudimentary in the male flowers, 3-celled, 1 ovule in each cell. Fruit a drupe, ½-¾ in. long, red, fleshy, containing 1-3 stones.

Flowers.—May, June.

Locality.—Gulmarg, 8,600-8,700 ft.; Pahlgam; Khelanmarg, 10,000 ft.; Tosh Maidan in forest, forming the undergrowth almost exclusively.

Distribution.—Temperate Himalaya, from Kashmir to Mishmi, 6,000-10,000 ft.; Khasia Hills, 5,000-6,000 ft.; Afghanistan.

PAPILIONACEAE.

LESPEDEZA, Mich.

A. Keel not blunt, strongly curved.
 I. Style densely feathery in the lower half *L. stenocarpa.*
 II. Style slightly hairy near the base... *L. eriocarpa.*
B. Keel blunt, slightly curved.
 I. Corolla twice the calyx in length.
 1. Flowers ¼ in. long or less.
 a. Flowers pale yellow or white tinged with purple. Leaflets ½-¾ in. long *L. sericea.*
 b. Flowers pale purple. Leaflets ¼-½ in. *L. juncea.*
 2. Flowers ½ in. long, pale yellow *L. Gerardiana.*
 II. Corolla less than twice the calyx in length.
 1. Leaflets ½-¾ in. long *L. elegans.*
 2. Leaflets 1-2 in. long *L. tomentosa.*



FIGS.—1, *Dictamnus albus*, Linn.; 2, *Skimmia laureola*, Sieb. & Zucc.; 3, *Lespedeza stenocarpa*, Klotzsch.; 4, *Lotus corniculatus*, Linn.; 5, *Ononis sp.*

Fig. 3. Lespedeza stenocarpa, Klotzsch.

Erect, 3-4 ft. high. Branches silvery silky. Leaves consisting of 3 leaflets, leathery, silvery silky below, inversely egg-shaped, rounded at the tip or truncate, with a sharp point. Racemes silvery silky when young, axillary, dense-flowered. Flower-stalks at flowering time as long as the calyx, in fruit twice as long. Calyx-teeth lanceolate, long-pointed, the upper ones ½ bifid. Corolla deep red, more than twice as long as the calyx. Keel acute, much incurved. Pod many times as long as the calyx, oblong-lance-shaped, indistinctly netted, margin long-ciliate, villous on the faces. Style persistent, ½ in. long, densely feathery in the lower half.

Flowers.—Autumn.

Locality.—Dachigam.

Distribution.—W. Himalaya, from Kashmir to Kumaon and Garhwal.

Lespedeza eriocarpa, DC.

A much-branched erect shrub. Stems 3-4 ft. high, with slender, angular, silky, furrowed branchlets. Leaves stalked, stalks ½-1½ in. long. Leaflets 3, egg-shaped or inversely egg-shaped, about 1 by ¾ in., upper surface hairless, dark green, lower hairy, paler. Flowers almost ½ in. long, deep purple-red, forming stalked racemes 3-6 in. long. Calyx ⅛ in. long, brown-silky, teeth linear-awl-shaped, twice as long as the tube. Corolla ⅜-½ in. long. Keel strongly curved, not blunt. Pod ¼ in. long, egg-shaped, hairy, not blunt, much longer than the calyx.

Flowers.—September.

Locality.—Temperate region.

Distribution.—Tropical and temperate zones of the Himalaya, from Kashmir to Sikkim, Khasia Hills.

Lespedeza sericea, Miq.

An erect undershrub, 2-3 ft. high, densely hairy, with tough long slender branches. Leaves nearly stalkless, crowded, overlapping. Leaflets 3, wedge-shaped, ½-⅜ by ⅛ in., upper surface nearly hairless, lower surface densely white-silky. Flowers ¼ in. long, nearly stalkless, pale yellow or white, tinged with purple, 2-4 on short stalks in the axils of the leaves all down the branch. Calyx ⅛-⅛ in. long, white-silky, teeth very long. Corolla twice the calyx. Keel slightly curved, blunt. Pod ⅛ in. long, thinly silky, hardly longer than the calyx.

Flowers.—July, August.

Locality.—At altitudes of 3,000-8,000 ft.

Distribution.—Throughout the Himalaya from Kashmir to Assam, China, Japan, Australia.

Lespedeza juncea, Pers.

A small shrub, 1-2 ft. high, finely downy, sometimes decumbent near the base. Leaves short-stalked, crowded, overlapping. Leaflets 3, $\frac{1}{4}$-$\frac{3}{4}$ in. long, inversely lance-shaped, upper surface nearly hairless, lower densely grey-silky. Flowers nearly stalkless, hardly $\frac{1}{4}$ in. long, pale purple, in numerous small axillary clusters. Calyx $\frac{1}{8}$-$\frac{1}{6}$ in. long, grey-silky, teeth three to four times as long as the tube. Keel slightly curved, blunt. Pod $\frac{1}{8}$ in. long, thinly silky, hardly longer than the calyx.

Flowers.—August.

Locality.—Temperate region, 4,000-8,000 ft.

Distribution.—Temperate W. Himalaya, from Kashmir to Kunawer, N. China, Siberia.

Lespedeza Gerardiana, Grah. Collett, fig. 38.

A shrub. Stems 1-3 ft. high, densely hairy. Leaves short-stalked, not crowded, slightly overlapping. Leaflets 3, inversely lance-shaped, $\frac{1}{2}$-$\frac{3}{4}$ by $\frac{1}{8}$ in., upper surface hairless, lower densely grey-silky. Flowers $\frac{1}{2}$ in. long, almost stalkless, pale yellow, in numerous, small, axillary clusters. Calyx $\frac{1}{12}$ in. long, grey-silky. Keel slightly curved, blunt, tipped with brown-purple. Pod $\frac{1}{10}$ in. long, hidden in the calyx.

Flowers.—August.

Locality.—Temperate region.

Distribution.—Temperate Himalaya, from Kashmir to Sikkim, 5,000-10,000 ft.

Lespedeza elegans, Camb.

Stems 2-3 ft. high, finely downy. Leaves of 3 leaflets; upper leaves suppressed; leaf-stalk $\frac{1}{2}$-$\frac{3}{4}$ in. long. Leaflets $\frac{1}{2}$-$\frac{3}{4}$ in. long, oblong, blunt, almost hairless above, densely grey-silky beneath. Flowers 6-8 in stalkless umbels, rarely in short racemes, reaching low down the branches and forming at the top a close leafless panicle. Calyx $\frac{1}{6}$-$\frac{1}{4}$ in. long, densely hairy; teeth very long, awl-shaped. Corolla by one half longer than the calyx. Pod $\frac{1}{6}$ in. long, oblong, downy.

Locality.—Temperate region, 5,000-6,000 ft. Apparently endemic.

Lespedeza tomentosa, Sieb.

Stems erect, 2-3 ft. high, densely hairy. Leaves short-stalked, distant. Leaflets 3, 1-2 in. long, blunt, thick, inversely egg-shaped-oblong, at first thinly silky above, densely silky beneath, veins raised below. Flowers forming stalkless or stalked, 2-4 in. long racemes. Flower-stalks very short.

Calyx $\frac{1}{6}$-$\frac{1}{5}$ in. long, densely hairy; teeth linear-awl-shaped, three to four times as long as the tube. Corolla whitish, by one half longer than the calyx. Standard not longer than wings and keel. Keel slightly curved, blunt. Pod stalkless, shorter than the calyx, oblong, hairy.

Locality.—Temperate region, 6,000-7,000 ft.

Distribution.—Temperate Western Himalaya, China, Japan, Korea.

LOTUS, Linn.

Fig. 4. Lotus corniculatus, Linn. Bird's Foot Trefoil.

A perennial hairless herb. Stems slender, half-erect, very short or more than 1 ft. high. Leaves of 5 leaflets. Leaflets egg-shaped, inversely egg-shaped or oblong, $\frac{1}{4}$-$\frac{3}{4}$ in. long, almost stalkless, entire, 2 at the base of the leaf-stalk, 3 at the tip, or 3 at the tip and 1 intermediate, or 1 at the base and 4 at the tip. Flowers about $\frac{1}{2}$ in. long, varying in colour from red to lemon colour, but usually golden yellow, 5 to 10 forming a long-stalked axillary umbel with a leaf of 3 leaflets close under it. Calyx not quite half as long as the corolla, teeth 5, at first pressed together and erect, triangular below, awl-shaped above, the points of the 2 upper teeth meeting. Standard longer than the wings, erect. Keel suddenly curved inwards, pointed. Upper stamen free, the others united. Style suddenly curved inwards just above the ovary, hairless. Pod cylindric, straight, 1-1$\frac{1}{2}$ in. long. Seeds several, separated from each other by divisions.

Flowers.—May to August.

Locality.—Dal district; near Shirazia Bagh, on hill; towards top of Hayan Pass, above 9,000 ft.; Magam, hanging from sides of ditches; Gulmarg, open glades in woods and on open hill-sides, about 8,500 ft., common.

Distribution.—Europe, Africa, Orient, W. Himalaya, from Kashmir to Nepal, Japan, Australia.

ONONIS, Linn.

Fig. 5. Ononis sp.

Flowers.—June.

Locality.—Ganderbal (Hallberg).

Ononis hircina, Jacq.

An undershrub. Stems ascending, hairy. Leaves with pinnately 3-foliolate leaflets. Leaflets oblong, blunt, toothed. Stipules (leaflets at base of leaves) large, leafy. Flowers reddish, in pairs at the axils of the leaves, forming a close

leafy raceme at the end of the branches. Calyx $\frac{3}{8}$ in. long, tube campanulate, teeth linear, longer than the tube. Standard roundish. Wings inversely egg-shaped, oblong. Stamens united into one bundle. Ovary almost stalkless, with few ovules. Pod oblong, downy, 2- and 3-seeded.

Locality.—Baltistan, Gilgit.

Distribution.—Temperate W. Himalaya, Orient, Europe, W. Siberia.

Plate 19.

ASTRAGALUS, Linn.

A. Perennial herbs. Flowers in dense, mostly stalked rounded heads. Stigmas naked.
 I. Flower-heads stalked. Flowers yellow. Leaflets more than 20.
 1. Corolla $\frac{1}{4}$-$\frac{1}{3}$ in. long *A. leucocephalus.*
 2. Corolla $\frac{3}{4}$ in. long. *A. cashmirensis.*
 II. Flower-heads stalkless or nearly so. Flowers yellow. Leaflets 21 and less *A. Munroi.*
 III. Flower-heads stalkless or stalked. Flowers lilac or purple.
 1. Leaflets 11-13 *A. densiflorus.*
 2. Leaflets 13-15 *A. melanostachys.*
 3. Leaflets 15-17 *A. oxyodon.*
 4. Leaflets between 19 and 25.
 a. Pod $\frac{1}{4}$ in. long *A. strictus.*
 b. Pod longer than $\frac{1}{4}$ in.
 i. Pod 6- to 10-seeded *A. tibetanus.*
 ii. Pod 5- and 6-seeded *A. himalayanus.*

B. Perennial herbs or undershrubs. Flowers in long racemes. Stigmas naked.
 I. Stipules large. Flowers yellow.
 1. Stipules 1-1$\frac{1}{2}$ in. long ... *A. graveolens.*
 2. Stipules $\frac{1}{2}$-$\frac{3}{4}$ in. long.
 a. Leaflets 9-15 *A. frigidus.*
 b. Leaflets 17-21 *A. vicioides.*
 II. Stipules small. Flowers lilac, pale green or pale yellow tinged with lilac.
 1. Leaflets between 13 and 17.
 a. Flowers lilac. Pod 5- and 6-seeded ... *A. macropterus.*

b. Flowers pale green, tinged with lilac. Pod 6- to 10-seeded ... *A. chlorostachys.*
c. Flowers pale yellow, tinged with lilac. Pod 6- to 8-seeded ... *A. Stewartii.*
2. Leaflets 17-19 *A. ciliolatus.*
3. Leaflets 21-25 *A. longicaulis.*

C. A perennial herb. Style bearded down the inner face below the stigma... *A. Heydei.*

D. Stigma pencilled (by which this group is distinguished from all the rest).
I. Annual herbs. Stems trailing. Pods stalkless. Flowers yellow or yellow tinged with purple.
1. Corolla primrose-yellow ... *A. Amherstianus.*
2. Corolla yellow, tinged with rose-purple *A. subumbellatus.*
II. Perennial herbs. Stems tufted, trailing. Pods stalked ... *A. tribulifolius.*
III. Tall perennial herbs. Erect or nearly so. Pods long-stalked. Flowers lilac.
1. Leaflets 13-17 *A. Falconeri.*
2. Leaflets between 25 and 41.
a. Hairless *A. adesmiaefolius.*
b. Obscurely silky ... *A. trichocarpus.*

E. Annual herbs. Flowers small, yellow. Stigma hairless.
I. Flower-heads lax, almost stalkless. Pods 1-1½ in. *A. ophiocarpus.*
II. Flower-heads dense, long-stalked. Pods ½-⅝ in. *A. gracilipes.*

F. Stemless or short-stemmed low shrubs. Stipules attached to the lower part of the leaf-stalk. Flowers large, yellow, forming close heads. Calyx swollen. Stigmas naked.
I. Stems distinct.
1. Leaflets 17-25 *A. Candolleanus.*
2. Leaflets 31-41 *A. malacophyllus.*
3. Leaflets 41-51 *A. pyrrhotrichus.*
II. Stemless *A. rhizanthus.*

G. Low shrubs. Stipules attached to the base of the leaf-stalk. Flowers large, yellow, without or with very short stalks in the axils of the leaves. Calyx swollen. Stigmas naked.

I. Leaflets slightly silky, at least when young.
 1. Leaflets 9-13 *A. polyacanthus.*
 2. Leaflets 31-41 *A. cicerifolius.*
II. Leaflets densely silky.
 1. Leaflets 13-17 *A. bicuspis.*
 2. Leaflets between 21-31.
 a. Flowers ¾ in. long ... *A. zanskarensis.*
 b. Flowers 1 in. long ... *A. leptocentrus.*

H. A low shrub. Leaf-axis hardened, spine-tipped. Leaflets falling off early. Calyx stalkless, narrowed equally to the base *A. strobiliferus.*

I. Perennial herbs, densely silky with appressed white bristly hairs fixed by the centre. Flowers yellow. Stigma hairless.
 I. Leaflets 9-13 *A. subulatus.*
 II. Leaflets 13-17 *A. nivalis.*
 III. Leaflets 21-25 *A. pedunculatis.*

Fig. 1. Astragalus leucocephalus, Grah.

A perennial herb. Stems 4-12 in. high, slender, ascending, densely covered with loose white hairs. Leaves 1-3 in. long. Leaflets 21-31, crowded, oblong, ⅛-¼ in. long, bluish-green, densely clothed with silvery white hairs, thick, blunt or almost pointed. Stipules small, leafy, united below the middle. Flowers pale yellow, ⅓ in. long, forming egg-shaped or oblong dense heads ½-¾ in. long. Stalk of head 2-6 in. long, densely white-hairy. Calyx ⅙ in. long, almost stalkless, teeth bristle-shaped, as long as the tube. Corolla ¼ in. long. Keel rather shorter than the standard and wings. Pod 1-celled, stalkless, oblong, ⅙ in. long, included in the calyx, downy, 3-4-, sometimes 5-seeded.

Flowers.—May.

Locality.—Gagribal, Gadsar, Pampur village, Dachigam.

Distribution.—Temperate and tropical W. Himalaya, 1,000-7,000 ft.; Kashmir to Kumaon, Punjab, Afghanistan.

Fig. 2. Astragalus cashmirensis, Bunge. Kashmir Vetch.

A perennial herb. Stems stout, erect or ascending, less than 1 ft. high, shaggy with long hairs. Leaves stalked, 3-4 in. long. Leaflets 29-33, close together, oblong, blunt or pointed, ⅜-½in. long, dull green, at first covered densely with long fine hairs. Stipules ½ in. long, free, lance-shaped, membranous, streaked. Flower-heads dense, round.

Stalk of head 1-3 in. long; flower-stalks up to $\frac{1}{8}$ in. long, shaggy. Calyx $\frac{3}{8}$-$\frac{1}{2}$ in. long, clothed with long hairs, teeth linear, shorter than the tube. Corolla yellow, $\frac{3}{4}$ in. long. Standard longer than the wings and keel. Pod $\frac{1}{2}$ in. long, linear-oblong, straight, ending in a long beak, finely hairy, 6- to 8-seeded.

Flowers.—July.

Locality.—Charpat, in Juniper tract; below Gulmarg. Temperate region, 9,000-10,000 ft. Apparently endemic.

Astragalus Munroi, Benth. Munro's Vetch.

A perennial herb. Rootstock long, stout, woody, spindle-shaped. Stems tufted, erect, stout, up to 1 ft. high, shaggy in all parts with dense spreading white hairs. Leaves $1\frac{1}{2}$-2 in. long. Leaflets 19-21, inversely lanceolate, blunt, $\frac{3}{4}$-1 in. long, thinly covered with loose white hairs. Stipules $\frac{1}{2}$ in. long, free, linear or lance-shaped. Flower-heads few-flowered, stalkless or nearly so, in the axils of the leaves. Calyx $\frac{1}{2}$-$\frac{5}{8}$ in. long, short-stalked, thinly hairy, teeth linear-bristle-shaped, almost as long as the tube. Corolla yellow, $\frac{3}{4}$-$\frac{7}{8}$ in. long. Petals almost equal. Pod oblong, 1 in. long, stalkless, much inflated, membranous, 10- to 12-seeded.

Locality.—Ladakh.

Distribution.—Alpine W. Himalaya, Kashgar.

Astragalus densiflorus, Kar. & Kir. Dense-flowered Vetch.

A perennial herb. Stems densely tufted, rigid, hairless, erect, $\frac{1}{4}$-1 ft. high. Leaves 1-2 in. long, Leaflets 11-13, thick, $\frac{1}{4}$-$\frac{1}{2}$ in. long, oblong, bluish-green, blunt. Stipules small, triangular, leafy, free. Flowers forming a dense, rounded head; stalk of flower-head 1-4 in. long, with a few black and white hairs in the upper half. Flower-stalks black. Calyx $\frac{1}{12}$-$\frac{1}{8}$ in. long, bell-shaped, teeth shorter than the tube, covered with mixed black and white hairs. Corolla lilac, 3 times the length of the calyx. Keel and wings much shorter than the standard. Pod wrinkled, silky, $\frac{1}{8}$ in. long, inflated, membranous, 1- to 2-seeded.

Locality.—Zaskar, Ladakh.

Distribution.—Alpine W. Himalaya, from Kashmir to Kunawer, 12,000-17,000 ft.; Afghanistan, Central Siberia.

Astragalus melanostachys, Benth.

A perennial herb. Stems $1\frac{1}{2}$-2 ft. high, rigid, hairless. Leaves 1-3 in. long, stalked. Leaflets 13-15, oblong, bluish-green, blunt or notched, $\frac{1}{2}$-$\frac{3}{4}$ in. long. Stipules $\frac{1}{4}$-$\frac{3}{8}$ in. long, free, leafy, triangular, sharp-pointed. Flower-heads dense,

1-3 in. long. Stalks of flower-heads 2-6 in. long, covered with short mixed black and white hairs. Calyx $\frac{1}{6}$-$\frac{1}{5}$ in. long, almost stalkless, covered with black silky hairs, teeth as long as the tube. Corolla narrow, by $\frac{1}{2}$ longer than the calyx. Keel and wings shorter than the standard. Pod oblong, stalkless, included in the calyx, $\frac{1}{3}$ in. long, covered with fine, black silky hairs.

Locality.—In the alpine region.

Distribution. — W. alpine Himalaya, 10,000-15,000 ft., Kashmir, Tibet.

Astragalus oxyodon, Bak.

A perennial herb. Stems densely tufted, slender, branched, $\frac{1}{4}$-$\frac{1}{2}$ ft. high, covered with appressed white silky hairs. Leaves 1-1$\frac{1}{2}$ in. long. Leaflets 15-17, oblong, blunt or almost pointed, densely white-hairy on the lower surface, thinly on the upper, alternate. Stipules united, silky on the lower surface. Stalk of flower-head 2-3 in. long, densely covered with mixed black and white hairs. Flower-stalks very short, black. Calyx $\frac{1}{3}$ in. long, clothed with appressed mixed black and white hairs, tube bell-shaped, teeth twice as long as the tube. Corolla $\frac{1}{2}$ in. long. Keel and standard the same length, wings much shorter. Ovary stalked, 5-6-ovuled, thinly silky.

Locality.—Ladakh. Apparently endemic.

Astragalus strictus, Grah.

A perennial herb. Stems $\frac{1}{4}$-1 ft. high, slender, ascending, branched, clothed with appressed white silky hairs. Leaves 1-1$\frac{1}{2}$ in. long, short-stalked. Leaflets 19-25, oblong, blunt, $\frac{1}{4}$-$\frac{3}{5}$ in. long, pale green, lastingly covered with white hairs. Stipules small, triangular, free, leafy. Flower-heads very dense, consisting of 20-40 flowers. Stalk of flower-head 2-4 in. long, a few black hairs mixed with silvery ones near the top. Flower-stalks black. Calyx $\frac{1}{6}$ in. long, covered with appressed mixed white and black hairs, teeth linear, shorter than the tube. Corolla twice as long as the calyx. Standard longer than wings and keel. Pod $\frac{1}{3}$ in. long, short-stalked, linear-oblong, rather bent back, clothed with appressed mixed black and white hairs, 6- to 8-seeded.

Locality.—Ladakh.

Distribution.—Alpine region of the Himalayas, 11,000-16,000 ft., from Kashmir to Sikkim and Sylhet.

Astragalus tibetanus, Benth. Tibetan Vetch.

A perennial herb. Stems zigzag, slender, ascending, ¼-½ ft. high, branched, thinly covered with appressed mixed black and white hairs. Leaves 2-4 in. long, stalked. Leaflets 21-25, oblong, blunt, pale green, at first thinly hairy, getting smooth above when mature. Stipules small, lance-shaped or triangular, free. Heads of 10-20 flowers almost round; stalk of flower-head 1-4 in., the black hairs prevailing upwards. Flower-stalks short, black. Calyx ⅜ in. long, the teeth bristle-shaped and densely black-silky, the tube thinly black-silky. Corolla twice as long as the calyx. Standard longer than the wings and keel. Pod ½-¾ in., linear, rather bent back, finely black-silky, 6- to 10-seeded; stalk shorter than the calyx-tube.

Locality.—Zaskar, Ladakh, Dras.

Distribution.—Temperate and alpine W. Himalaya, 9,000-14,000 ft., Afghanistan.

Astragalus himalayanus, Klotzsch.

A perennial herb. Stems 1-2 ft. high, very slender, weak, nearly hairless, with distant internodes, clothed in the young state with a few minute appressed white hairs. Leaves 1½-2 in. long. Leaflets 21-25, thin, oblong, blunt or notched, ¼-½ in. long, pale green, with a few short appressed white hairs. Stipules very small, lance-shaped, spreading. Stalk of flower-head shorter than the leaves, covered with mixed black and white hairs; flower-stalks 1/24 in. Calyx ⅛-⅙ in. long, bell-shaped, covered with very small appressed black and white hairs, teeth half the length of the tube. Corolla ½-⅝ in. long. Keel slightly longer than the wings, but shorter than the standard. Pod up to ½ in. long, linear-oblong, membranous, black-silky, 5- to 6-seeded, stalk longer than the calyx.

Locality.—Temperate and alpine regions, 5,000-13,000 ft.

Distribution.—W. temperate and alpine Himalaya, from Kashmir to Garhwal.

Fig. 3. Astragalus graveolens, Ham.

A tall undershrub with many bluish-green branches. Leaves 4-6 in. long. Leaflets 17-19, opposite or alternate, round-oblong, blunt, bluish-green, hairless on both sides, ½-1 in. long. Stipules heart-shaped, egg-shaped or lance-shaped, free, leafy, 1-1½ in. long. Flowers forming long-stalked racemes, ½-1 ft. long. Flower-stalks 1/12-⅛ in. long. Calyx tubular, hairless, ⅜ in. long, mouth oblique, teeth half as long as the tube. Corolla yellow, twice as long as the

calyx. Standard a little longer than the keel and wings. Pod 1-1¼ in. by ¼ in., sword-shaped, hairless, membranous, nearly straight, 12- to 18-seeded; stalk the length of the calyx.

Flowers.—May, June.

Locality.—Gadsar, roadside N. of river, rare; Dachigam; Kishtwar.

Distribution.—Temperate W. Himalaya, 4,000-12,500 ft., from Kashmir to Kumaon.

Astragalus frigidus, Bunge.

A perennial herb. Stems 1-2 ft. high, erect, stout, hairless. Leaves 4-6 in. long. Leaflets 9-15, opposite, 1 in. or more long, green, bluish-green below. Stipules egg-shaped or lance-shaped, blunt or pointed, free, ½-¾ in. long. Flowers forming long-stalked racemes which finally are 2-3 in. long. Flower-stalks 1/12-⅙ in. long, black-silky. Calyx ⅜ in. long, tubular. Corolla bright yellow, twice as long as the calyx. Standard longer than the wings and keel. Pod 1 in. long, hairless, membranous, oblong, narrowed to both ends, stalked, 6- to 8-seeded.

Locality.—Kishtwar.

Distribution.—Temperate W. Himalaya, from Kashmir to Garhwal, mountains through the north temperate zone.

Astragalus vicioides, Grah.

A perennial herb. Stems 1-2 ft. high, erect, hollow, hairless. Leaves ¼-½ ft. Leaflets 17-21, thin, oblong, blunt, 1-1½ in. long, green above, bluish-green with a few appressed hairs below. Stipules ½-¾ in. long, broad, united. Flowers forming long-stalked racemes, 2-3 in. long. Flower-stalks 1/12-⅛ in. long, almost hairless. Calyx ¼ in. long, tubular, hairless, except the very small teeth, mouth oblique. Corolla bright yellow, twice as long as the calyx. Petals equally long. Pod oblong, stalked, ½-¾ in. long, narrowed to both ends, hairless, 8- and 9-seeded.

Locality.—Kishtwar.

Distribution.—Temperate region of Himalaya, from Kashmir to Nepal.

Astragalus macropterus, DC.

An erect undershrub. Stems 2-3 ft. high, with many stiff, erect-spreading hairless branches. Leaves 2-3 in. long. Leaflets 13-17, inversely lance-shaped, ½-¾ in. long, thick, pale green. Stipules very small, lance-shaped, free, spreading, falling off early. Flowers forming lax racemes, ½-1 ft. long; stalks of racemes stiff, ½-1 ft. long. Flower-stalks 1/12 in. long.

Calyx bell-shaped, $\frac{1}{12}$ in. long, with a few small black hairs, teeth very small, triangular and sharp-pointed. Corolla lilac, $\frac{3}{8}$ in. long. Keel much shorter than the wings and standard. Pod oblong, stalkless, $\frac{1}{4}$-$\frac{1}{3}$ in. long, hairless, swollen, nearly straight, narrowed into a beak, 5- and 6-seeded.

Locality.—Ladakh, Zaskar.

Distribution.—Alpine W. Himalaya, 9,000-12,000 ft., W. and C. Siberia.

Astragalus chlorostachys, Lindl. Collett, fig. 37.

A tall undershrub. Stems several feet high, hairs present or absent. Leaves 4-6 in. long. Leaflets 13-17, oblong, blunt, $\frac{3}{4}$-1 in. long, green, both surfaces thinly hairy, lower paler. Stipules lance-shaped, small, free, spreading. Flowers many, pale green, tinged with lilac, $\frac{1}{2}$-$\frac{3}{4}$ in. long, crowded in long-stalked racemes 3-6 in. long. Flower-stalks $\frac{1}{12}$ in. long. Calyx tubular, finely downy, about half as long as the corolla, mouth oblique, teeth very short, triangular. Petals almost equal in length. Pod $\frac{1}{2}$ in. long, oblong, membranous, hairless, narrowed to both ends, 6- to 10-seeded, stalk twice as long as the calyx.

Locality.—Alpine and temperate region, 5,000-14,000 ft.

Distribution.—W. alpine and temperate Himalaya, from Kashmir to Kumaon.

Astragalus Stewartii, Bak. Stewart's Vetch.

An undershrub, much branched. Branches firm, many-ribbed, covered with copious appressed short white hairs. Leaves densely white-silky. Leaflets 13-15, oblong. Stipules $\frac{1}{4}$ in long, linear-bristle-shaped, spreading, falling off early. Flowers pale yellow, tinged with lilac, forming racemes 3-6 in. long. Calyx $\frac{1}{4}$ in. long, densely silky, teeth half as long as the tube. Pod oblong, swollen, $\frac{1}{4}$-$\frac{1}{3}$ in. long, stalked, hairless, 6- to 8-seeded.

Flowers.—August, September.

Locality.—Temperate region, 5,000-9,000 ft.

Distribution.—W. Himalaya, 5,000-14,000 ft.

Astragalus ciliolatus, Benth.

A perennial herb. Stems 1-2 ft. and more high, erect, hollow, hairless. Leaves 6-9 in. long. Leaflets 17-19, oblong, blunt, thin, green and almost hairless, $\frac{1}{2}$-1$\frac{1}{2}$ in. long, bluish-green, thinly white-silky at first below. Stipules $\frac{1}{4}$-$\frac{1}{2}$ in. long, lance-shaped or triangular. Corolla yellow, tinged with lilac, nearly twice as long as the calyx. Keel shorter than the

standard and wings, broad, suddenly curved upwards. Pod 1 in. long, oblong, swollen, stalked, narrowed into a beak, covered with fine, short, spreading, black hairs, 8- to 10-seeded; stalk the same length as the calyx.

Locality.—Ladakh, Kishtwar, 6,000-9,000 ft.

Distribution.—W. temperate Himalaya.

Astragalus longicaulis, Bak.

An undershrub. Branches with a few appressed silky hairs. Leaves 4-6 in. long. Leaflets 21-25, narrow-oblong, ½-¾ in. long, finely white-silky, greenish above, bluish-green beneath. Stipules very small, free, lance-shaped. Calyx ¼ in. long, with copious very small appressed black hairs and longer white ones, which latter, however, fall off soon, teeth half as long as the tube. Corolla pale yellow-lilac. Pod oblong, ½-⅝ in. long, swollen, hairless, stalked, narrowed at both ends, 10- to 12-seeded, stalk ¼-⅓ in. long.

Locality.—Temperate region. Seems to be endemic.

Astragalus Heydei, Bak. Heyde's Vetch.

A perennial herb, rising not more than 1 in. above the ground. Rootstock slender, woody. Leaves ¼-½ in. long. Leaflets 17-19, oblong, crowded, silvery-hairy, fleshy. Stipules small, fleshy, triangular, spreading. Flowers 2-4, forming a dense, umbellate head on a stalk ¼-½ in. long. Flower-stalks very small. Calyx ⅛ in. long, densely silvery-hairy, tube bell-shaped, teeth lance-shaped, triangular, rather shorter than the tube. Corolla more than twice as long as the calyx, rose-red with the tip darker. Petals almost the same length. Limb of standard round, deeply notched, bent back. Style bearded down the inner face below the stigma. Pod ½ in. long, oblong, membranous, hairless, short-stalked, much inflated, many-seeded.

Locality.—Rupshu.

Distribution.—Alpine region of W. Himalaya, 15,000-16,000 ft.

Astragalus Amherstianus, Benth. Amherst's Vetch.

An annual herb. Stems densely tufted, slender, trailing, covered with dense, appressed, shining, white hairs. Leaves 1-1½ in. long, short-stalked. Leaflets 13-17, narrow, oblong, blunt, ⅛-⅜ in. long, densely covered with thick, appressed, white hairs. Stipules very small, lance-shaped. Flowers 4-10, forming a dense, distantly stalked raceme. Flower-



FIGS.—1, *Astragalus leucocephalus*, Grah.; 2, *Astragalus cashmirensis* Bunge.; 3, *Astragalus graveolens*, Ham.; 4, *Astragalus malacophyllus* Benth.; 5, *Caragana brevispina*, Royle; 6, *Desmodium tiliaefolium*, G. Don.

stalks very short. Calyx $\frac{1}{6}$-$\frac{1}{3}$ in., nearly as long as the corolla, shaggy with hairs like the leaves, teeth bristle-shaped, as long as the tube. Corolla primrose-yellow. Pod stalkless, linear, swollen, $\frac{1}{2}$ in. long, curved, beaked, thinly hairy, 10- to 12-seeded.

Locality.—Kishtwar.

Distribution.—Temperate W. Himalaya, 6,000-10,000 ft., from Kashmir to Kunawer.

Astragalus subumbellatus, Klotzsch.

An annual herb. Stems $\frac{1}{4}$-1 ft. high, diffuse, branched, covered with short white hairs which fall off soon. Leaves 1-2 in. long. Leaflets 13-21, oblong, $\frac{1}{8}$-$\frac{3}{8}$ in. long, bluish-green, densely hairy or almost hairless. Stipules very small, lance-shaped, cusp-pointed. Flowers 6-10, forming a stalked, lax or dense raceme. Flower-stalks very short. Calyx $\frac{1}{8}$ in. long, thinly hairy, teeth bristle-shaped, as long as the tube. Corolla $\frac{3}{8}$ in. long, yellow tinged with rose-purple. Wings lance-shaped, shorter than standard and keel. Pod $\frac{1}{2}$-$\frac{3}{4}$ in. long, stalkless, cylindrical, much curved, shortly hairy, 20- to 24-seeded.

Locality.—Tropical and temperate regions.

Distribution.—Baluchistan, Afghanistan, Punjab, Hazara, Kashmir, up to 7,000 ft.

Astragalus tribulifolius, Benth.

A perennial herb, bluish-green, densely hairy. Rootstock long, woody, spindle-shaped. Leaves 1-2 in. long, thick, densely covered with short, spreading, white hairs. Leaflets 17-21, oblong, $\frac{1}{4}$-$\frac{3}{8}$ in. long. Stipules very small, triangular, leafy, free. Flowers few, forming a dense head on a stalk 1-2 in. long and with the short hairs growing black upwards. Flower-stalks very short. Calyx $\frac{1}{4}$ in., densely covered with short black hairs, teeth awl-shaped, as long as the tube. Corolla purplish, by one-half longer than the calyx. Standard $\frac{1}{4}$ in. broad. Wings much shorter than the keel. Ovary silky, stalked. Ovules about 20.

Locality.—Rupshu.

Distribution.—Alpine region of W. Himalaya, up to 14,500 ft.

Astragalus Falconeri, Bunge. Falconer's Vetch.

A perennial herb. Stems when young covered with short white hairs, when old getting almost hairless. Leaves 1-1$\frac{1}{2}$ in. long. Leaflets 13-17, bluish-green, blunt, inversely lanceolate-oblong, $\frac{1}{4}$-$\frac{1}{2}$ in. long. Stipules broad, leafy. A few

flowers forming a lax long-stalked raceme. Flower-stalks shorter than the calyx, downy. Calyx $\frac{1}{6}$ in. long, swollen, almost hairless, teeth very short. Corolla $\frac{1}{2}$ in. long, lilac. Wings lance-shaped, as long as the keel. Pod $\frac{1}{2}$-$\frac{5}{8}$ in. long, tapering at both ends, 4- to 6-seeded; stalk twice as long as the calyx.

Locality.—Astor, Wardwan, Ladakh.

Distribution.—Hazara, Kashmir.

Astragalus adesmiaefolius, Benth.

A perennial herb. Branches zigzag, hairless, woody, several feet high. Leaves 2-6 in. long. Leaflets 25-41, green, inversely egg-shaped, notched, rather fleshy, lower ones $\frac{1}{8}$-$\frac{1}{4}$ in. long, upper ones decreasing in length. Stipules obliquely heart-shaped, egg-shaped, leafy. Flowers forming a lax raceme $\frac{1}{2}$-1 ft. long. Flower-stalks very short. Calyx $\frac{1}{6}$ in. long, oblique, tubular-bell-shaped, hairless, teeth very small, triangular. Corolla $\frac{3}{8}$ in. long, lilac. Petals almost equal in length. Wings lance-shaped. Pod oblong, $\frac{3}{8}$-$\frac{1}{2}$ in. long, flat, hairless, tapering to both ends, 4- to 8-seeded; stalk more than twice as long as the calyx.

Locality.—Zaskar, Baltistan, Ladakh.

Distribution.—W. Himalaya, 8,000-12,000 ft.

Astragalus trichocarpus, Grah.

A tall, erect, nearly hairless undershrub, several feet high. Branches straight, grooved. Leaves 3-6 in. long, almost stalkless. Leaflets 30-41, oblong, $\frac{1}{4}$-$\frac{1}{2}$ in. long, almost blunt, pale green, covered with very small silvery hairs. Stipules very small. Flowers numerous forming stalked racemes 2-4 in. long. Flower-stalks short, covered with short mixed black and white hairs. Calyx bell-shaped, hairless, oblique, $\frac{1}{12}$ in. long, teeth triangular. Corolla lilac or pink, 4 to 5 times as long as the calyx. Limb of standard round. Wings lance-shaped, shorter than the keel. Pod $\frac{3}{4}$-1 in. long, oblong, finely downy, 4- to 6-seeded; stalk much longer than the calyx.

Locality.—Temperate region.

Distribution.—Temperate W. and C. Himalaya, from Kashmir to Kumaon.

Astragalus ophiocarpus, Benth.

An annual herb. Stems slender, up to 6 in. high, densely finely white-downy. Leaves stalked, $\frac{1}{2}$-1 in. long. Leaflets thick, oblong, notched at the tip, covered on both sides with short white hairs. Stipules lance-shaped, very small. Flowers

3-6 forming a raceme. Flower-stalks extremely small. Calyx less than $\frac{1}{12}$ in. long, densely hairy, teeth lance-shaped, shorter than the tube. Corolla yellow, nearly twice as long as the calyx. Petals almost equal in length. Stigma hairless. Pod 1-1½ in. long, slender, sickle-shaped, finely downy, very slightly constricted between the seeds, 10- to 12-seeded.

Locality.—Ladakh, 11,000 ft.

Distribution.—Persia, Kashmir.

Astragalus gracilipes, Benth.

An annual herb. Stems absent or short, almost erect, densely covered with strong white hairs. Leaves 1-3 in. long, long-stalked. Leaflets 9-13, greenish, oblong, blunt, ¼-⅜ in. long, densely covered with hairs like the stem. Stipules very small. Flowers 3-6 forming a dense head on a hairy 2-4 in. long stalk. Calyx tubular, ⅙ in. long, teeth bristle-shaped, short. Corolla pale yellow, twice as long as the calyx. Standard narrowed abruptly into a triangular tip. Wings and keel shorter than the standard. Pod cylindrical, ½-⅝ in. by ⅙ in., stalkless, covered with short, dense, white, bristly hairs, 10- to 12-seeded.

Locality.—Zaskar and Indus valley, 11,000-14,000 ft. Apparently endemic.

Astragalus Candolleanus, Royle.

A perennial. Stems woody, only a few inches high, beset below the tufts of leaves with the numerous woody leaf-axes of the old leaves. Leaves 3-4 in. long. Leaflets 17-25, oblong, blunt, bluish-green, ¼-½ in. long, more or less silky. Leaf-stalks 1-2 in. long, downy. Flowers many, forming dense heads. Flower-stalks ⅛-⅙ in. long, densely silky. Calyx ½ in. long, silky, teeth linear, ⅓ the length of the tube. Corolla large, 1 in. long, yellow. Wings shorter than the standard, keel shorter than the wings. Pod linear-oblong, ¾-1 in. long, narrowed from the middle to both ends, curved, short-stalked, 12- to 16-seeded.

Locality.—Temperate and alpine region, 8,000-13,000 ft.

Distribution.—Temperate and alpine W. Himalaya, from Kashmir to Kumaon.

Fig. 4. Astragalus malacophyllus, Benth.

A perennial. Stems densely hairy, up to 1 ft. high. Leaves 2-4 in. long. Leaflets 31-41, oblong, blunt, densely silky, ¼-½ in. long. Stipules lance-shaped, ⅛-½ in. long. Flowers forming short-stalked more or less dense heads, stalk of head 1 in. or less. Calyx ½ in. long, densely silky, teeth linear,

⅓ the length of the tube. Corolla 1½ the length of the calyx. Wings rather shorter than the standard. Keel still shorter. Pod oblong, ½ in. long, stalkless, narrowed suddenly at both ends, silky, 8- to 10-seeded.

Flowers.—June, July.

Locality.—Gulmarg, stony ground by nala and on rocky banks, above 7,000 ft., common; Kishtwar.

Distribution.—Temperate region of Kashmir, 8,000-11,000 ft. Apparently endemic.

Astragalus pyrrhotrichus, Boiss.

A perennial, shrubby. Stems short, densely covered with long, soft, pale brown hairs. Axis of leaf, including the stalk, 6-12 in. long, overtopping the flower-heads, covered with spreading hairs. Leaflets 41-51, green, roundish, or inversely egg-shaped, oblong, ¼-⅜ in. long, blunt with a very small sharp point. Stipules lance-shaped, silky, ½-¾ in. long. Flower-heads dense, 6- to 12-flowered, stalk 1-4 in. long. Flower-stalks short. Calyx ¾-⅞ in. long, silky, teeth bristle-shaped, nearly as long as the tube. Corolla by ½ longer than the calyx, yellow. Wings rather shorter than the standard, keel still shorter. Stigma naked. Pod ½ in. long, almost stalkless, silky, 10- to 12-seeded.

Locality.—Subtropical region.

Distribution.—Afghanistan, Punjab.

Astragalus rhizanthus, Royle.

Stemless, consisting of one or several tufts growing together from the crown of a woody rootstock. Leaf-stalk and leaf-axis densely silky, the axis 2-4 in. long, not persisting after the fall of the leaflets. Leaflets 31-41, bluish-green, ¼-½ in. long, oblong, blunt, silky on both sides. Stipules lance-shaped, ⅜-½ in. long, attached to the leaf-stalk in the lower part. Flower-heads dense, many-flowered, usually stalkless at the crown of the rootstock. Calyx ½-⅝ in. long, tubular, silky, teeth linear, half the length of the tube. Corolla by ½ longer than the calyx, yellow. Wings shorter than the standard, keel shorter than the wings. Pod almost stalkless, ½-¾ in. long, oblong, swollen, densely silky, narrowed abruptly into a beak, 15- to 20-seeded.

Locality.—Zaskar, Ladakh.

Distribution.—Temperate and alpine W. Himalaya, 9,000-16,000 ft., from Kashmir to Kunawer.

Astragalus polyacanthus, Royle.

A much-branched undershrub. Short branchlets armed with the crowded old leaf-axes which are not more than 1½-2 in. long. Leaflets 9-13, oblong, slightly silky or almost hairless, pale bluish-green, ¼-½ in. long. Stipules triangular or lance-shaped triangular, attached at the base to the petiole. Flowers large, yellow, stalkless, in the axils of the leaves, usually two together. Flower-stalks silky, ⅛-¼ in. long. Calyx ½ in. long, tubular, thinly silky or almost hairless, mouth oblique, teeth short, linear. Corolla twice as long as the calyx or slightly longer. Wings shorter than the standard, keel longer than the wings. Pod ½ in. long, swollen, stalkless, 15- to 20-seeded.

Locality.—Up to 12,000 ft.

Distribution.—Afghanistan, Plains of the Punjab and W. Himalaya up to 12,000 ft. from Kashmir to Garhwal.

Astragalus cicerifolius, Royle.

An undershrub armed with erect-spreading stiff straw-coloured leaf-axes, which are 3-6 in. long. Leaflets 31-41, thick, inversely lance-shaped or inversely egg-shaped-oblong, blunt at tip, sometimes notched, finely silky at first, mostly almost hairless when mature, pale green, falling off soon. Stipules lance-shaped or linear-lance-shaped attached at the base to the leaf-stalk. Flowers large, yellow, usually 3-4 together on short stalks in the axils of the leaves. Flower-stalks ⅛-¼ in. long. Calyx ½-⅝ in. long, with few appressed black or brownish silky hairs, teeth bristle-shaped, ⅓ the length of the tube. Corolla not quite twice the length of the calyx. Wings shorter than the standard, keel shorter than the wings. Pod ½-¾ in. long, oblong, swollen, narrowed to the point, densely silky, 15- to 20-seeded.

Locality.—Ladakh.

Distribution.—Temperate and alpine W. Himalaya, 10,000-17,000 ft. from Kashmir to Kunawer.

Astragalus bicuspis, Fisch.

A much-branched undershrub. Nodes on stem not crowded. Branches covered with dense spreading or bent down pale brown silky hairs. Leaf-axis forming an erect-spreading, straw-coloured spine 1-2 in. long. Leaflets 13-17, oblong, blunt or almost pointed, ¼-⅜ in. long, covered with a dense coat of hairs. Stipules lance-shaped and sharp-pointed, ¼-⅜ in.

long. Flower-heads consisting of 1-3 flowers in the axils of the leaves, stalkless. Flower-stalks very short. Calyx ½ in. long, clothed with dense silky hairs. Corolla yellow, ⅝-¾ in. long. Wings and keel much shorter than the standard. Pod ⅜-½ in. long, shaggy, almost stalkless, 8- to 10-seeded.

Locality.—Temperate region.

Distribution.—Hazara and Kashmir.

Astragalus zanskarensis, Benth.

An undershrub. The old part of the stems densely beset with rigid persistent leaf-axes 3-4 in. long. Stems short; branchlets with densely crowded nodes. Leaflets 21-25, oblong, blunt, falling off soon, ¼-⅜ in. long, densely pale brown, silky on both sides. Stipules lance-shaped, ½-in. long. Flowers about 6 forming short-stalked heads, much shorter than the leaves. Flower-stalks ⅛ in. long, densely hairy. Calyx ½-⅝ in., tubular, densely hairy, teeth bristle-shaped. ¼ the length of the tube. Corolla ¾ in. long, yellow. Wings shorter than the standard, keel shorter than the wings. Ovary oblong, short-stalked, silky, about 20-ovuled.

Locality.—Zaskar.

Distribution.—Temperate and alpine W. Himalaya, 10,000-14,000 ft.

Astragalus leptocentrus, Bunge.

An undershrub. Branches covered with dense, short, pale brown, spreading hairs. Branchlets with densely crowded nodes. Leaf-axes erect-spreading, 2-3 in. long, hairy. Leaflets 21-31, blunt, ⅛-⅜ in. long, covered on both sides with grey-brown silky hairs. Flowers 1-2 together in the axils of the leaves. Flower-stalks ⅛ in. long, silky. Calyx ½ in. long, silky, teeth linear-bristle-shaped, ⅓ the length of the tube. Corolla yellow, 1 in. long. Keel much shorter than the standard and wings. Pod oblong, ½-⅝ in. long, stalkless, silky, 12- to 14-seeded.

Locality.—Alpine region.

Distribution.—Alpine W. Himalaya, up to 14,000 ft., Hazara, Kashmir.

Astragalus strobiliferus, Royle.

A much-branched undershrub, a few inches high, densely armed with the spine-tipped, straw-coloured, 1-2 in. long, axes of the leaves. Leaflets 11-13, inversely lance-shaped, bluish-green,

stiff, pointed, ¼-⅜ in. long, hairy. Stipules triangular, attached to the leaf-stalk along their whole length except at the tip. Flowers few, stalkless in the axil of each leaf-stalk, scarcely exceeding the stipules. Calyx ¼ in. long, split down to the base, white-hairy. Corolla yellow, a little longer than the calyx. Petals of equal length. Standard fiddle-shaped. Pod stalkless, silky, 3- and 4-seeded.

Locality.—Temperate and alpine region.

Distribution.—W. Himalayas from Kashmir to Kunawer, 8,000-13,000 ft.

Astragalus subulatus, M. Bieb.

A perennial herb, up to 1 ft. high, branches thinly covered with very small white bristles. Leaves ½-1 in. long. Leaflets 9-13, linear, pale green, ½-¾ in. long, clothed with appressed white bristly hairs, each hair fixed by the centre. Stipules linear, very small. Racemes 1-2 in. long, bearing 3-12 flowers, stalks of racemes stiff, longer than the leaves, covered with mixed black and white appressed hairs. Flower-stalks very short. Calyx cylindrical, ½-⅝ in., densely covered with black and white bristles, teeth very small, lance-shaped. Corolla yellow, nearly twice as long as the calyx. Wings shorter than the standard, keel much shorter. Pod cylindrical, 1-1½ in. long, beaked, straight or slightly bent back, narrowed into a short stalk, 20- to 30-seeded, hairiness the same as of calyx.

Locality.—Alpine region, up to 12,000 ft.

Distribution. — Crimea, Afghanistan, Baluchistan, alpine W. Himalaya, W. Siberia, Chinese Tartary.

Astragalus nivalis, Kar. & Kir.

A perennial herb. Root thick, woody. Stems densely tufted, 3-6 in. high, slender, hairy. Leaves 1-1½ in. long. Leaflets 13-17, oblong, blunt, ⅛-⅜ in. long, densely white-hairy on both sides. Stipules small, lance-shaped, cusp-pointed, free. Flowers 6-20 forming a dense head, stalk of head 1-2 in. long, hairy. Calyx ½ in. long, membranous, densely silky, tubular first, becoming much inflated after the petals have fallen, teeth short, lance-shaped. Corolla yellow, nearly twice as long as the calyx. Wings shorter than the standard. Keel still shorter. Pod ¼-⅜ in. long, oblique oblong, stalked, silky, 2- to 4-seeded.

Locality.—Zaskar, Ladakh.

Distribution.—Alpine W. Himalaya, 11,000 - 16,000 ft., C. Siberia.

Astragalus peduncularis, Royle.

A perennial herb. Stems tall, 1-2 ft. high, erect, almost hairless, stiff, little branched. Leaves 3-4 in. long, axis channelled on the upper side. Leaflets 21-25, narrow-oblong, blunt, oblong, $\frac{3}{8}$-$\frac{1}{2}$ in. long, pale green, almost hairless above, hairy below. Stipules triangular, free. Racemes many-flowered, 2-4 in. long, dense upwards; stalk of raceme in the end 6 in. long. Flower-stalks very short. Calyx tubular, $\frac{1}{4}$ in. long, downy, teeth very short, upper ones triangular, lower ones lance-shaped. Corolla yellow, twice as long as the calyx. Keel and wings nearly equal in length, slightly shorter than the standard. Pod linear, stalkless, hairless, swollen, $\frac{1}{2}$-$\frac{3}{4}$ in. long, 15- to 20-seeded.

Locality.—Zaskar.

Distribution.—W. Himalaya from Kashmir to Kunawer.

CARAGANA, Lam.

Fig. 5. Caragana brevispina, Royle.

An erect shrub, several feet high, more or less hairy. Leaves pinnate, 2-3 in. long, clustered on short, thick branchlets. Leaflets 8-16, opposite, egg-shaped, inversely egg-shaped or oblong-egg-shaped, $\frac{1}{4}$-1 in. long, entire, hairless above, silky-hairy and paler below. Leaf-axis usually persisting as long thick spines, without or with 1 or 2 leaflets. Stipules spine-like. Flowers bright yellow, nearly 1 in. long, forming stalked few-flowered (2-4) umbels which are shorter than the leaves. Calyx slightly hairy, oblique, tubular, $\frac{1}{2}$ in. long, teeth 5, nearly equal, spine-tipped, shorter than the tube. Corolla hairless. Standard rounded, erect, with a short claw, sides bent back. Keel straight, blunt. Upper stamen free, others united. Ovary hairy. Style short, hairy, nearly straight. Pod flattened, $1\frac{1}{2}$-2 by $\frac{1}{5}$ in., hairy, woolly inside, 3- and 4-seeded.

Flowers.—May, June.

Locality.—Dachigam; Drang, above village, 7,000 ft.

Distribution.—Temperate W. Himalaya, 5,000-9,000 ft., from Kashmir to Garhwal, Chinese Tartary, Afghanistan.

DESMODIUM, Desv.

A. Leaves compound.
 I. Flowers ½ in. long.
 1. Lateral leaflets nearly as long as the end one.
 a. Pod ½-1 in. long *D. floribundum.*
 b. Pod 2-2½ in. long ... *D. tiliaefolium.*
 2. Lateral leaflets less than ¼ the length of the end one ... *D. gyrans.*
 II. Flowers ¼ in. long or less.
 1. Stems erect or nearly so. End leaflet 1 in. or more.
 a. Pod stalked. Flowers ⅛ in. long *D. podocarpum.*
 b. Pod stalkless. Flowers ¼ in. long.
 i. Upper margin of pod wavy, lower deeply indented... *D. concinnum.*
 ii. Upper margin of pod straight, lower slightly indented *D. polycarpum.*
 2. Stems prostrate or trailing. End leaflet ½ in. or less.
 a. Flowers in clusters opposite the leaves. Upper margin of pod not indented... *D. triflorum.*
 b. Flowers in racemes. Upper margin of pod deeply indented *D. parvifolium*
B. Leaves simple *D. gangeticum.*

Desmodium floribundum, G. Don. Collett, fig. 39.

A large erect shrub. Stems hairy. Branches woody, angular, densely hairy. Leaves of 3 leaflets. Leaflets entire, egg-shaped, blunt or sharp-pointed, both surfaces hairy, lower one pale; end-leaflet 2-3 by 1-1½ in. Stipules ½ in. long, lance-shaped. Flowers crowded in racemes, 3-6 in. long, arising from the axils of leaves or at the end of the branches. Flower-stalks ¼ in. long, erect-spreading, finely hairy. Calyx ⅛ in. long. Corolla pink-purple, nearly ½ in. long. Pod stalkless, densely hairy, ½-1 by $\frac{1}{10}$ in., upper margin slightly, lower deeply indented, joints of pod 3-8, rather longer than broad.

Flowers.—June to August.
Locality.—Subtropical and temperate region.
Distribution.—Tropical and temperate Himalaya, from the Upper Punjab and Kashmir to the Khasia Hills, up to 7,000 ft.

Fig. 6. **Desmodium tiliaefolium**, G. Don.

A tall, erect shrub. Stems hairy or nearly hairless. Leaves of 3 leaflets, leaf-stalk 2-3 in. long. Leaflets broadly egg-shaped, entire or sinuate, blunt or sharp-pointed, upper surface thinly hairy, lower usually grey-hairy or nearly hairless and pale, end-leaflet 2-4 by 1⅛-2¾ in. Racemes of flowers many, up to 12 in. long. Flowers pale pink, ½ in. long. Calyx ⅛ in. long, downy. Pod 2-3 in. by ¼ in., stalkless, hairy, upper margin slightly, lower deeply indented; joints 6-9, longer than broad.
Flowers.—July, August.
Locality.—Subtropical and temperate region; Sind Valley.
Distribution.—Tropical and temperate zones all along the Himalaya, 2,000-9,000 ft., from the upper Punjab to Burma.

Desmodium gyrans, DC.

Telegraph Plant, Semaphore Plant.

An erect undershrub, 3-4 ft. high. Branches scarcely woody, finally hairless. Leaves of 1-3 leaflets. Leaflets very unequal, the end one 2-4 in. long, oblong-lance-shaped, blunt at both ends, hairless above, bluish-green and more or less silky beneath, lateral leaflets much smaller or absent. Racemes in the axils of leaves at the end of the branches, often forming panicles. Flower-stalks ¼ in. long, downy. Calyx bell-shaped, hairless, teeth triangular, shorter than the tube. Corolla ¼ in. long, pink. Pod 1-1½ in. long, sickle-shaped, flat, shortly hairy, upper margin continuous, lower slightly indented between seeds; joints 6-10, inconspicuous, a little broader than long.
Flowers.—July, August.
Locality.—Subtropical region.
Distribution.—Outer Himalaya from Hazara to Assam, up to 7,000 ft., W. and S. India, Ceylon, Burma, Malay Islands, Philippines.

Desmodium podocarpum, DC.

An erect, small herb. Stems 2-3 ft. high, angular, finely hairy. Leaves of 3 leaflets; leaf-stalk 1-3 in. long. Leaflets entire, broadly inversely egg-shaped, usually sharp-pointed, lower surface pale, end-leaflet rounded, 1½-2½ by 1¼-2¼ in.

Racemes few, lax, up to 18 in. long, drooping. Calyx $\frac{1}{24}$ in. long, slightly bristly, teeth triangular, very short. Corolla pink, $\frac{1}{8}$ in. long. Pod $\frac{1}{2}$ in. long, stalked; stalk 3-4 times as long as the calyx, upper margin straight, lower deeply indented; joints 1-2, $\frac{1}{4}$ by $\frac{1}{8}$ in.

Flowers.—July, August.

Locality.—Subtropical and temperate region.

Distribution.—Tropical and temperate Himalaya, 2,000-7,000 ft., from Kashmir to Sikkim, Khasia Hills, China, Japan.

Desmodium concinnum, DC.

A tall undershrub with slender drooping branches, densely grey-hairy when young. Leaves of 3 leaflets. Leaf-stalk $\frac{1}{2}$ in. long. Leaflets $1\frac{1}{2}$-3 in. long, oblong, blunt, green, hairless above, the lower surface conspicuously parallel-veined and clothed with appressed silky hairs. Racemes many, up to 10 in. long, lax, in the axils of the leaves and at the end of the branches. Calyx-teeth triangular-lance-shaped. Corolla $\frac{1}{4}$ in. long, dark blue or bluish or purple. Pod $\frac{3}{4}$-1 in. long, short-stalked, upper margin not indented; joints 4-6, slightly downy.

Flowers.—July, August.

Locality.—Subtropical region.

Distribution.—Outer Himalaya, from the Upper Punjab and Kashmir to the Khasia Hills, Burma.

Desmodium polycarpum, DC.

An erect or almost erect undershrub. Branches slender, woody, angular, grey-hairy upwards. Leaves of 3 leaflets, 3-4 in. long, leaf-stalk $\frac{1}{2}$-$1\frac{1}{2}$ in. long. Leaflets $1\frac{1}{4}$-3 in. long, inversely egg-shaped, wedge-shaped, entire, pale green and often clouded above, clothed beneath with appressed grey hairs. Racemes dense, in the axils of the leaves and at the end of the branches, almost stalkless. Flower-stalks $\frac{1}{5}$ in. long. Calyx $\frac{1}{10}$ in. long, hairless, teeth long-pointed, longer than the tube. Corolla $\frac{1}{3}$ in. long, purple or pale bluish-purple, sometimes white. Pods stalkless, erect, $\frac{1}{2}$-1 in. long, crowded, straight, hairy, upper margin straight, lower slightly indented; joints 5-8.

Flowers.—July, August.

Locality.—Subtropical region.

Distribution.—Outer Himalaya up to 5,000 ft., C. and S. India to Ceylon, Burma, Malay Peninsula, Malay Islands, China, Japan, Philippines, tropical Africa.

Desmodium triflorum, DC.

A small trailing perennial herb. Stems tufted, 6-18 in. high, slender, hairy, much-branched. Leaves of 3 leaflets, ½ in. long. Leaf-stalk ⅛ in. long. Leaflets ⅛-¼ in. long, inversely egg-shaped, truncate or notched at the tip, hairless above, sparsely hairy beneath. Flowers 1-3 together in the axils of leaves. Flower-stalks about ¼ in. long. Calyx $\frac{1}{10}$ in. long, clothed with long white hairs, teeth long, bristle-shaped. Corolla ⅛ in. long, bright blue, or pink, or white. Pod about ½ in. long, stalkless, hairy or hairless, upper margin straight, lower slightly indented; joints 3-5.

Flowers.—August, September.

Locality.—On the Chenab, up to 7,000 ft.

Distribution. — Outer Himalaya and throughout India. Cosmopolitan in the tropics.

Desmodium parvifolium, DC.

A procumbent wide-trailing undershrub. Stems many-tufted, 6-24 in. high, much-branched, hairless or thinly hairy. Leaves of 3 leaflets. Leaflets ⅛-½ in. long, egg-shaped or inversely egg-shaped, entire, hairless above, thinly hairy below. Racemes many, usually at the end of the branches, longer than the leaves, ½-1 in. long, laxly 6- to 8-flowered. Calyx ⅛ in. long, hairy, teeth long-pointed. Corolla purple or purple-blue. Pod about ½ in., straight, hairy, both margins deeply indented; joints 3-5.

Flowers.—August, September.

Locality.—Subtropical region.

Distribution.—Outer Himalaya, throughout the plains of India to Ceylon, Burma, Malay Islands, China, Japan.

Desmodium gangeticum, DC.

A slender, almost erect undershrub, 2-4 ft. high. Stems slightly hairy, branches clothed with white appressed hairs. Leaves consisting of 1 leaflet. Leaf-stalk ½-1 in. long. Leaflet 4-6 in. long, egg-shaped-oblong, hairless above, slightly hairy below. Racemes many, 6-12 in. long, in the axils of the leaves and at the end of the branches. Flowers in numerous close-set fascicles. Calyx very small, finely downy, teeth longer than the tube. Corolla about ¼ in. long, pink or white, or tinged with lilac. Pod ½-⅝ in. long, stalkless, hairy, curved, upper margin slightly, lower deeply indented; joints 6-9, a little longer than broad.

Flowers.—April.

Locality.—On the Chenab up to 5,000 ft.

Distribution.—Outer Himalaya and throughout India to Ceylon and Burma, Malay Peninsula and Malay Islands, China, Philippines, tropical Africa.

Plate 20

LATHYRUS, Linn.

I. Leaflets 6-8.
 1. Corolla reddish or purplish ... *L. altaicus.*
 2. Corolla bright yellow *L. luteus.*

II. Leaflets 1-2.
 1. Corolla yellow. Leaflets 2 ... *L. pratensis.*
 2. Corolla bright red or lilac. Leaflets 1-2 *L. inconspicuus.*

III. Leaflets none *L. Aphaca.*

Fig. 1. Lathyrus altaicus, Led.

A perennial herb. Stem almost erect, 6-12 in. high, hairless. Leaves 2-3 in. long ending in a long tendril. Leaflets 6-8, oblong, bluish-green, membranous, ½-¾ in. broad. Stipules lance-shaped-tailed, slightly toothed. Racemes laxly 3- to 6-flowered. Stalk of raceme 2-4 in. long. Calyx ⅜ in. long, tube bell-shaped, oblique, lower teeth linear, nearly as long as the tube, upper teeth triangular. Corolla reddish or purplish, twice as long as the calyx. Standard broad, keel shorter than the wings. Stamens united into two bundles. Style flattened, bearded on the inner side.

Flowers.—June.

Locality.—Near Shirazia Bagh on jungly slope near top of hill; Chenab Valley, 6,000-8,000 ft.

Distribution.—Temperate W. Himalaya, Siberia.

Fig. 2. Lathyrus luteus, Bak.

A perennial hairless herb. Stems nearly erect, 2-3 ft. high. Leaves 3-5 in. long, axis ending in a bristle. Leaflets 6-8, egg-lance-shaped, about 3 by 1½ in., sharp-pointed. Stipules large, leaf-like, base 2-lobed. Racemes 6- to 12-flowered, as long or longer than the leaves, stalked. Calyx ⅜-½ in. long, lower teeth lance-shaped, upper ones triangular. Corolla bright yellow, tinged with orange, 1 in. long. Pod linear, beaked, 2-3 in. long. Seeds many.

Flowers.—June.

Locality.—Gulmarg, woods, about 8,000 ft., common.

Distribution.—Tropical and temperate W. Himalaya up to 10,000 ft., Soongaria, Altai, Orient, Europe.

Fig. 3. Lathyrus pratensis, Linn. Meadow Vetchling, Angle-berries, Craw-peas, Yellow Fitchling, Lady's Fingers.

An annual hairy herb. Stems trailing, 1-3 ft. high, angular, slightly downy, branched. Leaf-axis ending in a tendril. Leaflets 2, lance-shaped, 3-nerved, finely hairy beneath. Stipules (leaflets at the base of the leaf-stalks) large, leaf-like, broadly lance-shaped, arrow-shaped. Flowers yellow, $\frac{1}{3}$-$\frac{1}{2}$ in. long, many forming a long, stalked raceme, all turned one way. Flower-stalks as long as the calyx. Calyx $\frac{1}{4}$ in. long, teeth all linear, as long as the calyx. Corolla 3 times as long as the calyx. Pod hairless, $1\frac{1}{2}$ in. long, stalkless, with a long tapering point. Seeds many, flattened at the sides.

Flowers.—May to July.

Locality.—Gadsar, meadow near lake; Gulmarg, wooded hill-sides, above 7,000 ft., common.

Distribution.—Temperate W. Himalaya, 6,000-8,000 ft., from Kashmir to Garhwal, Orient, Abyssinia, Europe.

Lathyrus inconspicuus, Linn.

An erect, branched herb, 4-18 in. high. Stems slender, angled, hairless. Leaves of 2, rarely 1 leaflets. Leaf-stalk short, not winged. Leaf-axis produced at the tip into a short, straight, linear or lance-shaped bristle. Stipules (leaflets at base of leaf-stalk) $\frac{1}{5}$-$\frac{1}{3}$ in. long, linear-lance-shaped, tailed at the base. Leaflets almost stalkless, 1-3 in. long, linear-lance-shaped, hairless, distinctly nerved below. Flowers solitary in the axils of the leaves. Flower-stalks short. Calyx $\frac{1}{5}$ in. long, hairless, teeth linear-lance-shaped, as long as the tube. Corolla $\frac{1}{3}$ in. long, bright red or lilac. Pod 1-2 by $\frac{1}{5}$ in., linear, compressed, slightly bent at the tip, hairless. Seeds 10-12.

Flowers.—April, May.

Locality.—At altitudes of 4,000-5,000 ft.

Distribution.—Sind, Punjab, Kashmir, Baluchistan, Afghanistan, Mesopotamia, Syria.

Fig. 4. Lathyrus Aphaca, Linn. Leafless Yellow Vetchling.

A perennial, hairless herb. Stems trailing, 1-3 ft. high. The leaves are tendrils. Stipules (leaflets at the base of the leaf-stalk) leaf-like, heart-shaped, triangular, about 1 by $\frac{1}{2}$ in., entire. Flowers pale yellow, single, rarely 2, on long stalks in the axils of the leaves, erect. Calyx-lobes green, linear, about as long as the corolla. Pod 1-$1\frac{1}{4}$ in. long, sickle-shaped, broad, nearly erect, beaked, netted. Seeds 4-8, smooth, flattened.



FIGS.—1, *Lathyrus altaicus*, Led.; 2, *Lathyrus luteus*, Baker; 3, *Lathyrus pratensis*, Linn.; 4, *Lathyrus Aphaca*, Linn.; 5, *Geum urbanum*, Linn.; 6, *Geum elatum*, Wall.; 7, *Geum elatum*, Wall.; 8, *Geum sp.*

Flowers.—May, June.
Locality.—Srinagar, Gagribal.
Distribution.—Throughout N. India, ascending to 7,000 ft., W. Asia, N. Africa, Europe.

ROSACEAE. The Rose Family.

GEUM, Linn.

I. Radical leaves 4-6 in. long. Flowers ½-¾ in. diameter. Style jointed in the middle	*G. urbanum.*
II. Radical leaves 6-12 in. long. Flowers 1-1½ in. diameter. Style not jointed	*G. elatum.*

Fig. 5. Geum urbanum, Linn. Herb-Bennet, Avens.

A perennial herb. Stems 1-3 ft. high, erect, from a woody rootstock, sparsely softly hairy. Radical leaves long-stalked, with lobes each side of a common stalk, the end-leaflet large, rounded, scalloped, lobed, the lateral ones stalkless, oblong. Stem-leaves made up of 3 leaflets, variable. Stipules large, lobed and cut. Flowers small, ½-¾ in. diameter, pale yellow, erect. Calyx lobes bent back. Style sharply bent inwards, jointed near the middle, lower portion hairless, becoming elongated and hooked in fruit, end-portion hairy, finally breaking off. Petals spreading, inversely egg-shaped. Fruit a globose head of densely hairy achenes.
Flowers.—May, June.
Locality.—Tanmarg, 7,000 ft.; Gadsar, shady spots along river; near Shirazia Bagh on hill; in forest N. of Hayan Pass, 8,000 ft.; Drang; Gulmarg, woods, above 8,000 ft., common.
Distribution.—Temperate W. Himalaya, 6,000-11,000 ft., from Kashmir to Kumaon, Siberia and westwards to the Atlantic.

Figs. 6 and 7. Geum elatum, Wall.

A perennial herb. Stems 12-18 in. high from a stout woody rootstock. Radical leaves pinnately cut, 4-12 in. long. Segments crenate or sharply toothed, often lobed; lateral segments many, nearly or quite distinct, with a broad base, stalkless, egg-shaped or oblong, up to 1 in. long, pairs alternately large and small, gradually diminishing in size from the uppermost downwards, end-segment much larger, 3-lobed. Stem-leaves few, small, pinnately lobed. Flowering stems

with few leaves and 1 to 6 flowers. Flowers 1-1½ in. diameter. Calyx-lobes triangular egg-shaped, silky, spreading in fruit. Petals rounded, bright yellow, much longer than the calyx. Style hairless, nearly straight, simple, not jointed or hooked in fruit.

Flowers.—July, August.

Locality.—Aporwat above Gulmarg, grassy meadows and hill-sides, above 9,500 ft., common ; Tosh Maidan.

Distribution. — Subalpine and alpine Himalaya, from Kashmir, 9,000-12,000 ft., to Sikkim, 12,000-15,000 ft.

Fig. 8. Geum sp.

Flowers.—July.

Locality. — Khelanmarg above Gulmarg, open grassy meadows, 10,000 ft. Only one specimen found by Mrs. Wathen.

Plate 21

POTENTILLA, Linn. Cinquefoil.

In the following key only the lower leaves are being considered.

A. Stamens 1-5-10.
 II. Leaflets 5-9 (pinnately arranged) ... *P. albifolia.*
 I. Leaflets 3 (digitately arranged), (fig. 5) *P. Sibbaldi.*
B. Stamens many.
 I. Receptacle (top of flower-stalk inside the calyx) with long stiff hairs which entirely conceal the achenes.
 1. Leaves pinnate.
 a. Leaflets 5-7.
 i. Plant not tufted *P. fruticosa.*
 ii. Plant very densely tufted (fig. 8) *P. Inglisii.*
 b. Leaflets 7-9 *P. Salessovii.*
 2. Leaves of 3 leaflets.
 a. Petals rounded *P. ambigua.*
 b. Petals rounded, inversely heart-shaped at the tip (fig. 6) ... *P. eriocarpa.*
 II. Achenes not concealed by the long hairs of the receptacle.
 1. Leaves pinnate.
 a. Pairs of leaflets alternately large and small *P. anserina.*

b. Pairs of leaflets not alternately large and small.
- i. Leaflets 3-5 *P. multifida.*
- ii. Leaflets 5-7 *P. Clarkei.*
- iii. Leaflets 3-11.
 - A. Petals longer than the calyx.
 - *aa.* Leaflets coarsely toothed *P. fragarioides.*
 - *bb.* Leaflets cut nearly to the midrib *P. sericea.*
 - B. Petals shorter than the calyx *P. supina.*
- iv. Leaflets 5-15 *P. bifurca.*
- v. Leaflets many *P. pedunculariis.*

2. Leaves digitate.
 a. Leaflets 3.
 - i. Flowers dark crimson (fig. 1) *P. atrosanguinea.*
 - ii. Flowers yellow or red (fig. 2) *P. leucochroa.*
 - iii. Flowers yellow.
 - A. Flowers $\frac{1}{4}$ in. or less diameter *P. Kleiniana.*
 - B. Flowers more than $\frac{1}{4}$ in. diameter.
 - *aa.* Leaflets deeply crenate *P. gelida.*
 - *bb.* Leaflets coarsely crenate at tip *P. monanthes.*
 - *cc.* Leaflets truncate and trifid at tip (fig. 7) ... *P. curviseta.*
 - *dd.* Leaflets white beneath.
 - *i.* Flowers $\frac{3}{4}$-$1\frac{1}{2}$ in. diameter *P. argyrophylla.*
 - *ii.* Flowers $\frac{1}{2}$ in. diameter *P. nivea.*

 b. Leaflets 5.
 - i. Flowers dark crimson or bright rose-coloured (fig. 3) ... *P. nepalensis.*
 - ii. Flowers yellow.
 - A. Flowers $\frac{1}{3}$ in. diameter or less.
 - *aa.* Achenes deeply wrinkled *P. Kleiniana.*
 - *bb.* Achenes smooth ... *P. argentea.*
 - B. Flowers $\frac{1}{2}$-$\frac{3}{4}$ in. diameter.
 - *aa.* Flowers forming a leafy head *P. desertorum.*
 - *bb.* Flowers in large spreading cymes *P. kashmirica.*
 - *cc.* Flowers solitary in the axils of the leaves ... *P. reptans.*

The species figured on Plate 21 are described first; the rest follow, for practical reasons, in alphabetical order.

Fig. 1. Potentilla atrosanguinea, Lodd.

A perennial herb. Stems erect or straggling, 2-3 ft. high, very hairy. Leaves digitately divided into 3 leaflets, long-stalked, alternate. Leaflets 2-3 in. long, upper surface green, finely hairy, lower white-hairy. Stipules attached to the leaf-stalk. Flowers long-stalked, dark crimson or orange, ¾-1½ in. diameter. Calyx 5-lobed. Petals 5. Stamens many. Fruit a cluster of many achenes with long styles; achenes not concealed by long hairs of the receptacle.

Flowers—July.

Locality.—Sach Pass; Pangi, open damp meadows, about 11,000 ft., common.

Distribution.—Temperate Himalaya, 8,000-12,000 ft.

Fig. 2. Potentilla leucochroa, Lindl.

A perennial herb. This species resembles *Potentilla atrosanguinea* in most details. It is a smaller plant; the leaflets sometimes reach only ½ in., and are often densely silky on the upper and lower surface. The flowering stems are 1 few-flowered, and the flowers are yellow or red.

Flowers.—June.

Locality.—Thajwas.

Distribution.—From Kashmir to Nepal, 10,000-15,000 ft.

Fig. 3. Potentilla nepalensis, Hook. Collett, fig. 46

A perennial herb. Stems erect, 1-3 ft. high, hairy, from a woody rootstock. Leaves long-stalked, digitately divided. Leaflets 5, often only 3 in the upper leaves, egg-shaped or oblong-egg-shaped, stalkless, 1-3 by ¼-1¼ in. long, teeth large, blunt, or sharp, upper and lower surfaces thinly hairy. Flowers dark crimson or bright rose-coloured, veined, claw darker, ¾-1 in. diameter, in spreading panicles at the end of the branches, stalked. Petals inversely heart-shaped at tip, longer than the calyx. Achenes very many on a globose hairy receptacle, wrinkled.

Flowers.—June to September.

Locality.—Drang, above village, 7,000 ft.; Yus Maidan; below Gulmarg, woods, open glades and grassy hillsides, above 7,000 ft., common.

Distribution.—W. temperate Himalaya, 5,000-9,000 ft., from Murree and Kashmir to Kumaon.

Fig. 4. **Potentilla argyrophylla**, Wall. Coventry pl. XVIII.

This plant agrees in nearly all the details with the *Potentilla atropurpurea*. I cannot find any difference between the two species except the yellow flowers of *P. argyrophylla* and in the dark crimson ones of *P. atropurpurea*. J. D. Hooker seems to be right in uniting the two species, but they would have to go under the name of *P. atrosanguinea*, Lodd.

Flowers.—June to August.

Locality.—Basam Gali, on paths below Pass; Tosh Maidan, on top of the ridge; Damam Sar, 13,100-13,500 ft.; above Gulmarg, grassy and rocky hill-side, above 10,000 ft., common.

Distribution.—Temperate Himalaya, 8,000-14,000 ft.

Fig. 5. **Potentilla Sibbaldi**, Haller f. Sibbaldia.

A perennial herb, clothed with long silky hairs, bluish-green. Stems tufted, 2-12 in. high, procumbent or ascending. Rootstock woody, flattened. Leaves downy on both sides, digitately compound. Leaflets 3, wedge-shaped, tip 3-5-toothed, otherwise entire. Flowering stems in the axils, leafy, ascending. Flowers pale yellow, in a close cyme at the end of the stem. Petals small, narrow or absent, lance-shaped, not longer than the calyx. Stamens 5, alternate with the petals, sometimes 1-5, opposite to them. Achenes hairless.

Flowers.—May to July.

Locality.—Gulmarg, 8,600-8,700 ft.; Khelanmarg, 10,000 ft.; Tosh Maidan, 10,000 ft.; below Basam Gali, in open situations above 10,000 ft.; Damam Sar, 13,300 ft., abundant; Gangabal.

Distribution.—Alpine Himalaya, 12,000-15,000 ft., mountains of N. temperate zone, arctic regions.

Fig. 6. **Potentilla eriocarpa**, Wall.

A perennial, nearly hairless. Rootstock very stout, long. Branches ascending, 4-10 in. high. Leaves few. Leaf-stalk ½-3 in. long, very slender, digitately divided. Leaflets 3, wedge-shaped, cut and toothed above the middle, green on both surfaces. Stipules silky. Flowering stems from the tips of the branches, slender, 2-18 in. long, almost erect, hairless or faintly silky, with 1 or 2 almost sessile leaves above the middle. Flowers 1-1½ in. diameter, solitary, stalk ½-3 in. long. Calyx hairless, lobes egg-shaped, sharp-pointed. Petals rounded, inversely heart-shaped, yellow, much longer than the calyx. Achenes very small, covered with long hairs.

Flowers.—June.
Locality.—Sonamarg.
Distribution.—Temperate and alpine Himalaya, from Kashmir to Sikkim, 12,000-14,000 ft.

Fig. 7. Potentilla curviseta, Hook. f.

A perennial herb, thinly silky. Leaves few, 2-3 in. long, digitately divided. Leaflets 3, narrowly linear-wedge-shaped, truncate and trifid at the tip, ½-1 by ⅛-⅓ in., almost erect, leathery, hairy on both surfaces, teeth sharp. Leaf-stalk stiff, with a brown sheath formed by the stipules, free part of the stipules small, awl-shaped, entire. Flowering stems slender, 2-3 in. high, bearing 2-3 flowers, slender, with opposite linear bracts at the middle and a cut bract where the flower-stalks begin. Calyx ¼ in. diameter, silky, lobes lance-shaped, long-pointed. Stamens and carpels about 20. Achenes 5-6, obliquely egg-shaped. Receptacle flat, densely hairy.
Flowers.—June.
Locality. — Haramukh ; Tilail, 12,000 ft. Apparently endemic in Kashmir.

Fig. 8. Potentilla Inglisii, Royle.

A low, very densely tufted shrub. Leaves pinnately compound. Leaflets 3-7, linear-lance-shaped, quite entire, ½ in. long. Flowers many, bright yellow, usually solitary, at the end of the stem; stalks silky. Calyx-lobes egg-shaped or lance-shaped. Petals broadly inversely egg-shaped, much longer than the calyx. Stamens many. Achenes hairy.
J. D. Hooker treats this species as a variety of *P. fruticosa* (see below).
Flowers.—June.
Locality.—Above Zoji La.
Distribution.—Temperate and subalpine Himalaya, from Kashmir to Kumaon.

Potentilla albifolia, Wall.

A perennial herb. Stems many, slender, hairy, branched, 6-12 in., spreading. Leaves pinnately compound. Leaflets 5-9, very unequal, ½-1 in. long, rounded or inversely egg-shaped or egg-shaped, deeply and sharply toothed, lateral leaflets gradually or often irregularly diminishing in size from the uppermost pair downwards, upper surface green and almost hairless, lower snow-white. Leaf-stalk very slender. Stipules sometimes ½-¾ in. long, loose sheathing, brown,

attached to the leaf-stalk for ½ their length. Flowers yellow, ¼ in. diameter, on slender stalks in the axils of the leaves. Calyx white-hairy, lobes triangular. Petals oblong, shorter than the calyx. Stamens 5. Achenes many, large, furrowed, hairless.

Flowers.—July.

Locality.—Mitshan Marg.

Distribution.—Subalpine Himalaya, from Kashmir, 8,000-10,000 ft., to Sikkim, 12,000-15,000 ft.

Potentilla ambigua, Camb.

A perennial herb. Stems 1-6 in. high, tufted, silky or hairless, leafy. Rootstock stout or slender. Leaves digitately divided. Leaflets 3, inversely egg-shaped or rounded-wedge-shaped, bluntly 3-toothed or 3-fid at the broad tip, ¼-½ in. long. Leaf-stalk ¼-1 in. long. Stipules leafy. Flowers ½-1 in. diameter, yellow, stalk ¼-1 in. long. Calyx hairy or almost hairless, lobes triangular, sharp-pointed. Petals rounded, much longer than the calyx. Achenes many, clothed with long silky hairs.

Locality.—At altitudes of 10,000-14,000 ft.

Distribution. — Temperate and alpine Himalaya, from Kashmir to Sikkim, 9,000-15,000 ft.

Potentilla anserina, Linn. Silverweed.

A perennial herb, 3-12 in. high. Rootstock very short, slender, branched, sending out long racemes, 1 ft. and more long. Leaves forming a spreading tuft from the crown, 2-10 in., green above, silky beneath, pinnately divided, with stolons from the axils. Leaflets 6-10 pairs, pairs of leaflets alternately large and small, single leaflets oblong or inversely egg-shaped, deeply toothed, the teeth tipped with silky hairs or divided nearly to the base, close, stalkless. Stipules enclosing the buds, hooded. Flowers large, ½-1 in. diameter, solitary, yellow on solitary slender stalks in the axils of the leaves. Flower-stalk 1-6 in. long. Calyx-lobes lance-shaped, long-pointed. Petals rounded. Achenes many, smooth.

Locality.—Baltistan, 7,700 ft.

Distribution.—W. Himalaya up to 16,000 ft., Kashgar, N. Asia, Orient, Europe, N. America, Australia.

Potentilla argentea, Linn. Silvery Cinquefoil.

A perennial herb, 4-18 in. high, prostrate or ascending, covered with closely pressed, woolly, silvery hairs. Rootstock short, woody. Stems slender, branched, leafy. Leaves digitately divided, stalked, the upper nearly stalkless. Leaflets

5, narrow, wedge-shaped, inversely egg-shaped, cut, toothed, white and downy below, with a rolled-back or bent-back margin, half-divided nearly to the base. Flowers small, $\frac{1}{8}$ in. diameter, yellow, in more or less of a corymb. Flower-stalks $\frac{1}{2}$-$1\frac{1}{2}$ in. long. Calyx densely hairy, lobes sharp-pointed. Petals slightly longer than the calyx, inversely egg-shaped. Achenes smooth and hairless on a hairy receptacle.

Locality.—Pir Panjal, Alibad, 8,000 ft.

Distribution.—Soongaria, N. Asia, Orient, Europe.

Potentilla bifurca, Linn.

A perennial herb, covered with appressed silky hairs. Rootstock long, slender, branched. Stems 4-8 in. high, almost erect or spreading, leafy. Leaves $\frac{1}{2}$-2 in. long. Leaflets 5-15, linear-oblong or oblong, 2-3-fid or parted at the apex, otherwise entire, stalkless, $\frac{1}{6}$-$\frac{3}{4}$ in. long. Leaf-stalk slender. Stipules sharp- or long-pointed. Flowers $\frac{1}{2}$ in. diameter, solitary or in cymes on slender stalks $\frac{1}{2}$-1 in. long. Calyx-lobes broad, rather blunt. Petals inversely egg-shaped, yellow, much longer than the calyx. Achenes few, somewhat triangular, blunt, smooth, hairless except at the base, longer than the hairs of the receptacle.

Locality.—At altitudes of 10,000-14,000 ft.

Distribution.—Alpine Himalaya, from Kashmir to Sikkim, 13,000-17,000 ft., Soongaria, Altai Mountains, Mongolia, Caucasus, Taurus.

Potentilla Clarkei, Hook. f.

A perennial herb, stout, leafy, covered with long spreading hairs. Stems 1 ft. high, ascending from a woody rootstock. Leaves 1-2 in. long, clothed all over with spreading hairs. Leaflets 5-7, stalkless, leathery, inversely egg-shaped, toothed $\frac{1}{3}$ way down, lower lateral ones sometimes wedge-shaped and 2-3 toothed. Flowers stalked in forked cymes with leafy branches and cut leaf-bracts forming a kind of wrapper round a cluster of flowers. Flower-stalk $\frac{1}{2}$-1 in. long. Flowers $\frac{1}{2}$ in. diameter. Calyx-lobes sharp-pointed. Petals inversely egg-shaped, yellow. Stamens many. Achenes many, wrinkled; receptacle hairy.

Flowers.—May.

Locality.—Gadsar; near Shirazia Bagh on hill, 7,000-9,000 ft.

Distribution.—Seems to be endemic in Kashmir.

Potentilla desertorum, Bunge.

A perennial herb, erect, leafy, clothed with soft, spreading, often glandular hairs. Stems tufted, arising from a woody rootstock. Radical leaves 4-8 in. long, long-stalked (2-6 in.); leaflets 5, stalkless, membranous, 1-2 in. long, inversely egg-shaped, coarsely crenate, green on both surfaces. Stem-leaves short-stalked or stalkless, of 3 leaflets. Stipules ½-¾ in. long. Flowers ½-¾ in. diameter, hidden amongst the uppermost leaves, forming rounded leafy heads. Stalk of head straight and stout, getting longer in fruit. Calyx ⅓ in. long, lobes lance-shaped. Petals rounded to inversely egg-shaped, dark yellow, slightly longer than the calyx. Achenes many, wrinkled; receptacle globose, hairy.

Locality.—Kashmir Valley; Kishtwar, 7,000-9,000 ft.

Distribution.—Kashmir, Soongaria.

Potentilla fragarioides, Linn. (including P. Leschenaultiana, Ser.).

A perennial herb. Stems 2-12 in. high, robust, erect or nearly so, hairy. Leaves pinnately compound, 1-10 in. long. Leaflets 5-11, often only 3 in the upper leaves, ½-1 in. long, membranous or rather leathery, egg-shaped, or oblong-egg-shaped, or inversely egg-shaped, lateral leaflets gradually diminishing in size from the uppermost pair downwards, end-leaflet ½-1½ in. long, teeth large, blunt or sharp-pointed, upper surface green, hairy, lower densely clothed with long pale or white hairs. Flowers yellow or white, ⅓-⅔ in. diameter, almost stalkless or long-stalked, in open, terminal corymbs. Calyx hairy, lobes triangular or oblong. Petals twice as long as the calyx, rounded, inversely heart-shaped or inversely egg-shaped. Stamens many. Achenes wrinkled or smooth, hairless; receptacle hairy.

A very variable plant as to size of various parts and hairiness.

Flowers.—May, June.

Locality.—Nadiar, on banks of canal, often along the road.

Distribution.—Temperate Himalaya, from Waziristan and Kashmir to Bhutan; Nilgiris, 7,000 ft.; Siberia to China and Japan.

Potentilla fruticosa, Linn. Shrubby Cinquefoil.

An erect or prostrate, much-branched, leafy shrub, up to 4 ft. high. Leaves ½-1½ in. long, pinnately compound. Leaflets 3-7, leathery, ⅓-⅔ in. long, oblong-lance-shaped or egg-lance-shaped, entire, sharp-pointed, upper surface densely silky, lower hairless. Flowers many, bright yellow, ⅔-1½ in.

diameter, solitary at the end of the branches; stalks silky, below 1 in. in length. Calyx-lobes egg- or lance-shaped. Petals inversely egg-shaped much exceeding the calyx. Stamens many. Achenes many, very small, with long hairs, concealed entirely in the long stiff hairs of the receptacle.

This is an extremely variable plant. Hooker describes 5 varieties. One of his varieties, var. *Inglisii*, has been figured on Plate 21, fig. 8, and has been described above as a distinct species, *P. Inglisii*, Royle. I do not consider it a very good species. It can, however, be distinguished by the dwarf and densely tufted habit and by the linear-lance-shaped leaflets.

Locality.—Temperate and subalpine region.

Distribution.—From Kashmir, 8,000-12,000 ft., to Sikkim, 12,000-16,000 ft., N. Asia, Europe.

Potentilla gelida, C. A. Mey.

A perennial herb, mostly clothed with soft, spreading hairs, sometimes glandular. Leaves digitately divided, consisting of 3 leaflets. Leaflets ½-¾ in. long, stalkless or with a short stalk, inversely egg-shaped or wedge-shaped, deeply crenate, crenatures very large, sometimes only 4 or 5 towards the end of the leaflet, entire for ½ or ⅓ from the base upwards. Leaf-stalk ½-2 in. long. Stipules or stem-leaves ¼-⅓ in. long, entire, very hairy. Flowering stems slender, almost naked. Flowers yellow, ½-1 in. diameter, usually 1-4 on slender stalks. Calyx hairy, lobes sharp-pointed. Petals inversely heart-shaped. Achenes many, hairless; receptacle very hairy.

Flowers.—June.

Locality.—Basam Gali, on paths below Pass.

Distribution.—W. temperate Himalaya, from Kashmir to Kunawer, 13,000-17,000 ft., from the Caucasus to Dahuria.

Potentilla kashmirica, Hook. f.

A perennial herb, covered with soft, spreading hairs. Stems erect, leafy, about 1 ft. high, rather slender. Leaves 2-3 in. long, short-stalked, digitately divided into 5 leaflets. Leaflets inversely egg-shaped-oblong, 1-1½ in. long, stalkless, cut ⅓ way down into lobes or serratures, lateral lobes softly hairy on both surfaces, paler and almost silky on the lower. Leaf-stalk 1-2 in. long. Stipules lance-shaped, sharp-pointed. Flowers ½ in. diameter, many, in large forked cymes. Calyx silky, lobes egg-shaped, long-pointed. Petals inversely heart-shaped, yellow, by ⅓ longer than the calyx. Achenes many, deeply wrinkled; receptacle globose, hairy.



FIGS.—1, *Potentilla atrosanguinea*, Lodd.; 2, *Potentilla leucochroa*, Lindl.; 3, *Potentilla nepalensis*, Hook.; 4, *Potentilla argyrophylla*, Wall.; 5, *Potentilla Sibbaldi*, Haller f.; 6, *Potentilla eriocarpa*, Wall.; 7, *Potentilla curviseta*, Hook. f.; 8, *Potentilla Inglisii*, Royle.

This plant is nearly related to *P. nepalensis*, but has shorter leaf-stalks, more deeply cut leaflets, yellow flowers and achenes more strongly wrinkled.

Locality.—Baramula ; Nowgunge, 7,500 ft.

Distribution.—Seems to be endemic in Kashmir.

Potentilla Kleiniana, Wight & Arn.

An annual herb. Stems many, slender, prostrate, leafy, ½-2 ft. high, thinly hairy. Leaves digitately divided into 3 or 5 leaflets. Leaflets ½-2 in. long, egg-shaped or narrowly oblong, teeth blunt or sharp-pointed. Flowers ¼ in. diameter, yellow, forming cymes at the end of the stems. Calyx sparsely silky, lobes entire. Petals slightly longer than the calyx. Achenes very small, deeply wrinkled ; forming a globose head. Receptacle hairless.

Locality.—Temperate region.

Distribution.—Temperate Himalaya, from Kashmir, 3,000-7,000 ft., to Sikkim, 4,000-9,000 ft., and Bhutan, Khasia Hills, 4,000 ft., Nilgiris, 6,000-7,000 ft.

Potentilla monanthes, Lindl.

A perennial herb, tufted, glandular, or sparsely hairy. Stems 2-12 in. high. Leaves short-petioled, digitately divided into 3 leaflets. Leaflets ⅙-⅔ in. long, broadly inversely wedge-shaped, coarsely crenate at the tip, glandular-hairy on both surfaces. Leaf-stalk up to 1 in. long. Flowering stems very many, ascending, leafy. Flowers stalkless and short-stalked at the top of the stem, ⅛-½ in. diameter, yellow. Calyx hairy, hemispheric, lobes broad, blunt. Petals inversely egg-shaped-rounded, slightly longer than the calyx. Achenes very many and small, smooth. Receptacle very hairy.

Locality.—Alpine region.

Distribution.—Alpine Himalaya, from Kashmir to Sikkim, 10,000-15,000 ft.

Potentilla multifida, Linn.

A perennial herb. Stems many, softly white-hairy, almost erect, or prostrate, or ascending, stout or slender, arising from a short erect rootstock. Leaves ½-2 in. diameter, pinnately divided. Leaflets 3-5, hairless above, softly white-hairy beneath, linear-oblong or inversely egg-shaped, pinnately divided, nearly to the base, segments of leaflets linear or lance-shaped, with the margins bent back. Flowers yellow, ½-⅔ in. diameter, forming cymes, or few together, or solitary, almost sessile or on long slender stalks. Calyx silky, lobes

egg-shaped, sharp-pointed. Petals rounded to inversely egg-shaped, notched. Achenes many, very small, hairless. Receptacle hairy.

The above description does not cover all the variations that have been observed in this protean plant.

Locality.—Baltal.

Distribution.—W. Himalaya, from Kashmir to Kumaon, 10,000-16,000 ft., China, Orient, N. and C. Asia and Europe, temperate and arctic N. America.

Potentilla nivea, Linn.

A perennial herb, dwarf, covered with white appressed hairs. Rootstock very stout, woody. Leaves 1-2 in., digitately divided into 3, rarely 5 leaflets. Leaflets ¼-1 in. long, stalkless, very leathery, inversely egg-shaped, sharply toothed, hairless or silky above, snow-white beneath. Leaf-stalk stout. Stipules egg-shaped, sharp-pointed, downy, entire or toothed. Stem with 1, rarely more, reduced leaves. Flowering stem 1-3-flowered. Flowers ½ in. diameter, on stout stalks. Calyx woolly, lobes sharp-pointed. Petals inversely heart-shaped. Achenes few, pale, smooth, faintly wrinkled. Receptacle densely woolly.

Locality.—High alpine region.

Distribution.—Drier alpine Himalaya, 10,000-17,000 ft., from the Caucasus to the Alps, Arctic and cold regions of N. Europe, Asia and America.

Potentilla peduncularis, Don.

A perennial herb. Rootstock very long, stout. Leaves 2-18 in. long, 1-2½ in. broad, pinnately divided. Leaflets many, oblong, deeply toothed, silky or hairless above, covered beneath with long, soft, appressed silvery hairs, ½-1½ in. long, tip rounded, stalkless. Leaf-stalk slender or stout. Lower stipules membranous, upper leafy, toothed. Flowering stems erect or ascending, as long as the leaves, with 1 or 2 leaves and a few-flowered irregular corymb. Flowers ¾ in. diameter, flower-stalk getting longer after flowering. Calyx silky, lobes triangular, sharp-pointed. Petals yellow, rounded. Stamens 20-30. Achenes few, $\frac{1}{10}$ in. diameter, dark brown. Receptacle very hairy.

The very large achenes distinguish this species from every other Indian species.

Flowers.—June, July.

Locality.—Tosh Maidan, W. side of ridge, abundant; Damam Sar, 13,000 ft.

Distribution.—Alpine Himalaya, from Kashmir to Sikkim, 12,000-14,000 ft.

Potentilla reptans, Linn. Cinquefoil, Yellow Cinquefoil, Fiflef, Five-finger-blossom, Golden-blossom.

A perennial creeping herb. Rootstock woody. Runners 1-2 ft., slender, leafy at the nodes. As it lies on the ground it is never more than 6 in. high. Leaves digitately divided into 5 leaflets, stalked. Stalks 1-6 in. long, slender. Leaflets 1-2 in. long, membranous, sometimes with very short stalks, inversely egg-shaped, or inversely lanceolate, toothed, blunt at the tips. Stipules small, oblong, entire. Flower-stalk 1-4 in. long, erect, solitary in the axils of the leaves, 1-flowered, naked. Flowers ½-¾ in. diameter. Calyx-lobes broad or narrow, sharp-pointed. Petals inversely heart-shaped, golden-yellow. Achenes many, dark brown.

Flowers.—May, June.

Locality.—Saida Kadal, Chenar Bagh.

Distribution.—N. temperate zone of Europe, N. and W. Asia, Afghanistan, Kashmir, N. China, Japan, Abyssinia.

Potentilla Salessovii, Steph.

A perennial silky herb, shrubby below. Stems 1-3 ft. high. Leaves 4-6 in. long. Leaflets 7-9, oblong, blunt, coarsely toothed above the middle, 1-1½ in. long, short-stalked, leathery, white or green beneath, base rounded. Leaf-stalk stout. Flowers 1 in. diameter, very many in branched, leafy cymes. Calyx hairy, lobes egg- or lance-shaped, long-pointed. Petals inversely egg-shaped-oblong, longer than the calyx. Stamens many. Achenes many, very small, hairy, concealed by the long, stiff hairs of the receptacle.

Locality.—At altitudes of 11,000-14,000 ft.

Distribution.—Alpine W. Himalaya, Altai and Thian Shan Mountains.

Potentilla sericea, Linn.

A perennial herb, white, densely silky, very variable, getting smaller with increasing elevation from 18-3 in. Rootstock very stout, perpendicular, with many heads. Leaves 1-6 in. long, crowded, oblong, pinnate. Leaflets 5-11, oblong, all cut nearly to the mid-rib, rarely only ½ way, silky on both surfaces, margins bent back. Flowers yellow, ¼-¾ in. diameter, many in dense, hairy corymbs in larger plants, few- or 1-flowered in the smaller. Calyx-lobes triangular-egg-shaped or lance-shaped. Petals rounded, inversely egg-shaped. Achenes many, smooth.

Locality.—At heights of 9,000-17,000 ft.

Distribution.—W. alpine Himalaya from Kashmir to Kumaon, Orient, Soongaria, N. China, N. America.

Potentilla supina, Linn.

An annual herb. Stems many from the root, 6-18 in. high, spreading, branched, leafy, hairy, stout or slender. Leaves ½-3 in. long, pinnate. Leaflets 3-9, oblong, ¼-1 in. long, crenate or sharply toothed, sometimes lobed, both surfaces thinly hairy. Leaf-stalk ½-2 in. long. Stipules egg-shaped, entire. Flowers ¼-⅓ in. diameter, solitary in the axils of the leaves, stalks ⅙-½ in. Calyx-lobes blunt or sharp. Petals yellow, oblong, smaller than the calyx. Achenes many, very small, smooth or ridged. Receptacle very hairy.

Locality.—Up to 8,500 ft., Kashmir Valley, Baltistan.

Distribution. — Throughout the warmer parts of India, Afghanistan, Europe, N. Asia, Africa.

Plate 22

SAXIFRAGACEAE. The Saxifrage Family.

SAXIFRAGA, Linn. The Saxifrage.

The key contains also the species of Saxifraga figured on Plate 23.

A. Surface of leaves not pitted.

I. Calyx adhering to the base of the ovary, calyx-lobes erect in fruit. Petals white, much longer than the calyx. Radical leaves stalked, kidney-shaped, lobed.

1. No bulbils in the upper axils... *S. sibirica.*
2. Bulbils in the upper axils ... *S. cernua.*

II. Sepals more or less united, spreading in fruit. Petals white with 2 yellow dots at base. Leaves undivided, crenate to serrate ... *S. pallida.*

III. Sepals nearly free, in fruit spreading or bent back. Petals yellow or whitish, sometimes purple-spotted at the base. Leaves entire, lower ones stalked, upper stalkless, more or less stem-clasping.

1. Stems at base and near the axils of the leaves clothed with crisp, reddish brown hairs.

a. Basal leaves none. Lower leaves not larger than the middle ones *S. Moorcroftiana.*

b. Basal leaves present. Stem leaves getting smaller from the base upwards.
i. Basal leaves never heart-shaped... *S. hirculus.*
ii. Basal leaves heart-shaped *S. diversifolia.*
2. Stems without crisp, reddish-brown hairs.
a. No runners arising from the rosette of leaves... ... *S. Jacquemontiana.*
b. Runners arising from the rosette of leaves... ... *S. flagellaris.*

B. Surface of leaves pitted.
I. Leaves alternate.
1. Petals shorter than the stamens, always yellow *S. Meeboldii.*
2. Petals much longer than the stamens.
a. Flowers stalked *S. ramulosa.*
b. Flowers almost stalkless.
i. Petals white *S. imbricata.*
ii. Petals pale rose-coloured *S. Duthiei.*
II. Leaves decussately opposite ... *S. oppositifolia.*

Fig. 1. **Saxifraga sibirica**, Linn. The Siberian Saxifrage.

Stems solitary or almost tufted. Flowering stems weak, erect, often flexuous or bent, 2-8 in. high, in the upper part cymose-panicled, almost hairless or more or less glandular-hairy. Bulbils in the axils of the basal leaves numerous, egg-shaped. The lowest stem-leaves not rosulate, few, erect-spreading, hairless or more or less glandular-hairy, the blade gradually narrowed into the stalk which is 2-3 times as long as the blade, $\frac{1}{5}$-$\frac{4}{5}$ in. long, $\frac{1}{3}$-$1\frac{1}{2}$ in. broad, 7-9-lobed, lobes shortly and broadly ovate, the middle lobe often notched; upper stem-leaves almost stalkless, kidney-shaped or 3-lobed, lobes egg-shaped or oblong; uppermost stem-leaves entire. Branches of inflorescence $\frac{3}{5}$-$2\frac{2}{5}$ in. long, 1-4-flowered, hairy, like the stem. Flower-stalks 2-4 times as long as the flowers. Sepals erect-spreading, ovate-oblong, $\frac{1}{8}$-$\frac{1}{5}$ in. long, 3-nerved. Petals inversely egg-shaped-wedge-shaped, often slightly notched, up to $\frac{7}{12}$ in. long, $\frac{1}{7}$-$\frac{1}{4}$ in. broad, 3-nerved, white. Stamens half as long as the petals. Ovary more or less glandular-hairy. Styles short. Capsule egg-shaped-oblong, about $\frac{1}{3}$ in. long, with the sepals erect. Seeds oblong, blackish, minutely dotted.

Flowers.—July to September.

Locality.—Damam Sar, 13,500 ft; hills above Gulmarg,

stony hill-tops, above 12,000 ft., common; Tosh Maidan; Zaskar; Kishtwar, 6,600-10,000 ft.; Margan Pass, 10,000 ft.; Karakoram, 11,000-13,500 ft.

Distribution.—W. Himalaya, 9,000-14,000 ft., from Kashmir to Garhwal, Caucasus, Central Mediterranean region, Central Asia, temperate E. Asia.

Fig. 2. Saxifraga cernua, Linn.

Stems solitary, 4-6 in. high. Flowering stems erect or curved at the base and ascending, bearing bulbils in the upper axils, usually 1-flowered, rarely in the upper part, 2-5-branched, hairless below, or all along glandular-hairy, often purplish. Bulbils in the axils of the basal leaves larger. Lower stem-leaves long-stalked, kidney-shaped, $\frac{1}{8}$-$\frac{3}{4}$ by $\frac{3}{8}$-1 in., palmately 3-5-7-lobed, lobes usually broadly egg-shaped, blunt or sharp-pointed. Upper stem-leaves short-stalked or almost stalkless, 3-5-fid. Uppermost leaves entire, egg- or lance-shaped. Branches of inflorescence with a terminal normal or rudimentary flower, bearing bulbils. Flower-stalks longer than the flower, glandular-hairy. Sepals spreading, egg-shaped, or oblong-egg-shaped, $\frac{1}{10}$-$\frac{1}{8}$ in. by $\frac{1}{18}$-$\frac{1}{12}$ in., 3-nerved. Petals inversely egg-shaped-oblong, wedge-shaped below, $\frac{1}{3}$-$\frac{1}{2}$ in. by $\frac{1}{8}$-$\frac{1}{5}$in., $2\frac{1}{2}$-4 times as long as the sepals, notched at the tip, 3-nerved, white. Stamens almost as long as to twice as long as the sepals. Ovary oblong-egg-shaped. Styles about $\frac{1}{25}$ in. long.

Flowers.—June, July.

Locality.—Zoji La; N. of Ladakh.

Distribution.—Europe, W. Asia, alpine and subalpine Himalaya up to 17,000 ft., temperate E. Asia, Pacific N. America.

Fig. 3. Saxifraga pallida, Wall.

Flowering stems variable in length, 2-16 in. high, few- or many-flowered, panicled or corymbosely panicled above, mostly covered along the whole length with white hairs. Basal leaves few, rosulate, herbaceous, egg-shaped, rhomboid-egg-shaped, oblong-egg-shaped to oval, $\frac{1}{3}$-3 in. long, margin crenate to serrate, heart-shaped or truncate at the base or wedge-shaped. Branches of inflorescence $\frac{1}{5}$-$2\frac{2}{5}$ in. long, erect-spreading, densely hairy like the stem. Sepals not bent back, neither in flower nor in fruit, egg-shaped or triangular-egg-shaped, up to $\frac{1}{10}$ in. long, with a hairless margin, sparingly hairy below, purplish. Petals often almost horizontally spreading, broadly egg-shaped to almost rounded, $\frac{1}{10}$-$\frac{1}{6}$ in. long, $\frac{1}{12}$-$\frac{1}{8}$ in. broad, 3-nerved, white, with 2 yellow spots at the base. Filaments

of stamens club-shaped, as long as or shorter than the petals. Anthers violet. Styles very short, stout. Capsule oblong, $\frac{1}{4}$-$\frac{2}{5}$ in. long. Seeds oblong, brown, longitudinally striated by 10-12 rows of tubercles.

Flowers.—June, July.

Locality.—Above Zoji La; Badzulkod Nala; Liddar Valley, 13,500 ft.

Distribution.—Alpine and subalpine Himalaya, from Kashmir to Sikkim, 13,000-17,000 ft., Bhutan, S. and W. China.

Saxifraga Moorcroftiana, Wall. Moorcroft's Saxifrage.

Solitary, having bulbils and few leaves at the base. Stem erect, $\frac{2}{3}$-$1\frac{1}{3}$ ft. high, hairless at the base, at the apex glandular-hairy, sparingly leafy, mostly many-, rarely 1-flowered at the top. Basal bulbils elongate, club-shaped, $\frac{2}{5}$-$\frac{3}{5}$ in. long. Basal leaves spoon-shaped, short, up to $\frac{1}{2}$ in. long, $\frac{1}{6}$ in. broad; lower stem-leaves oblong or oblong-spoon-shaped, $\frac{4}{5}$-$1\frac{2}{5}$ in. long, about $\frac{2}{5}$ in. broad, hairless, stalk $\frac{2}{5}$-$\frac{4}{5}$ in. long; middle stem-leaves oblong, $1\frac{1}{3}$-2 in. long, $\frac{2}{5}$-$\frac{3}{5}$ in. broad, stalkless, stem-clasping; upper stem-leaves shorter and narrower towards the base, all clothed at the base with rust-coloured hairs; uppermost leaves and bracts oblong, about $\frac{3}{5}$ in. long, $\frac{1}{3}$ in. broad, with glandular hairs on the margin. Lower stalks of the corymbose inflorescence up to $1\frac{3}{5}$ in. long, 2-flowered, densely glandular-hairy. Flower-stalks as long as or longer than the flowers. Sepals shortly egg-shaped or almost rounded, $\frac{1}{6}$-$\frac{1}{3}$ in. long, on the margin shortly glandular-hairy. Petals oblong or inversely egg-shaped-oblong, $\frac{1}{3}$-$\frac{2}{5}$ in. long, $\frac{1}{6}$ in. broad, whitish, 5-nerved. Anthers kidney-shaped. Ovary shortly egg-shaped. Capsule crowned by the two very short divergent styles.

Locality.—Plains of Deosai on the shores of the Shersan Lake, 14,500 ft., Namharu Pass.

Distribution.—Alpine and subalpine Himalaya, from Kashmir to Nepal, Yunnan.

Fig. 4. Saxifraga hirculus, Linn.

Runners prostrate or slightly ascending, giving rise to erect 1-5-, rarely many-flowered stems. Internodes of runners hairless or covered with dark brown hairs, lower and middle internodes of stems hairless, upper ones longer and more or less brown-hairy, mixed with glandular hairs. Leaves of suckers and lower stem-leaves herbaceous, bright green, paler below, inversely egg- to lance-shaped, or lance-shaped, blunt, $\frac{2}{3}$-$1\frac{1}{3}$ in. by $\frac{1}{3}$-$\frac{1}{2}$ in., stalk $\frac{2}{5}$-$2\frac{2}{5}$ in. long, sheathing at the base;

middle and upper stem-leaves linear-lance-shaped or narrowly oblong, $\frac{2}{5}$-$\frac{4}{5}$ in. long, $\frac{1}{25}$-$\frac{1}{8}$ in. broad, clothed at the base with very long rust-coloured hairs. Flowering stems 1-1$\frac{1}{3}$ ft. long, mostly 1-3-flowered. Sepals oblong, clothed with short, rust-coloured hairs, $\frac{1}{10}$-$\frac{1}{5}$ in. long, first erect, during flowering time spreading, in fruit bent back. Petals usually 3 times as long as the sepals, inversely egg-shaped-oblong or oblong, about $\frac{1}{2}$ in. long and $\frac{1}{6}$-$\frac{1}{3}$ in. broad, sometimes reaching $\frac{3}{5}$ by $\frac{1}{5}$ in., yellow, without spots or red-dotted above the base up to the middle, rarely smaller, $\frac{2}{5}$-$\frac{1}{3}$-$\frac{1}{6}$ in. long, 3-nerved. Stamens half the length of the petals. Ovary mostly oblong-egg-shaped. Styles spreading. Capsule oblong-egg-shaped, about $\frac{2}{5}$ in. long, about $\frac{1}{5}$ in. diameter, crowned with the styles up to $\frac{1}{12}$ in. long. Seeds oblong-egg-shaped, smooth.

Flowers.—June, July.

Locality.—Aporwat, above Gulmarg on stony hill-tops, about 13,000 ft., common.

Fig. 5. Saxifraga hirculus, Linn., var. **alpina,** Engl.

This alpine variety can be distinguished by the following details: Stems densely covered with rust-coloured hairs. Lower leaves close together, upper ones distant. Sepals scarcely bent back. Petals only twice or 1$\frac{1}{2}$ times as long as the sepals, inversely egg-shaped-oblong, $\frac{1}{3}$ by $\frac{1}{6}$ in. or smaller, sometimes densely ciliate, with 2 hairy glands at the base. Capsule shortly egg-shaped.

Flowers.—June, July.

Locality.—Above Zoji La, 14,000-14,500 ft.

Distribution.—Alpine Himalaya, from Kashmir to Sikkim, 11,000-17,000 ft.

Saxifraga hirculus, Linn., var. **hirculoides,** C. B. Clarke.

Stems 2-3 in. high, often very densely clothed with rust-coloured hairs upwards, 1-flowered. Sepals scarcely bent back. Petals without pits or glands at the base, as long as the sepals or shorter.

Distribution.—W. Himalaya, 17,000 ft.

Saxifraga hirculus, Linn., var. **subdioica,** C. B. Clarke.

This variety resembles the previous variety, but the stems are 3-6 in. high and bear 4-10 flowers in short corymbs or congested. Sepals scarcely bent back. Petals without glands, as long as the sepals or shorter. The stigmas are obscure, and some flowers seem functionally male, whilst others with no visible stigma produce perfect seeds.

Distribution.—W. Himalaya, 15,000-17,000 ft.



FIGS.—1, *Saxifraga sibirica*, Linn.; 2, *Saxifraga cernua*, Linn.; 3, *Saxifraga pallida*, Wall.; 4, *Saxifraga hirculus*, Linn.; 5, *Saxifraga hirculus*, Linn., var. *alpina*, Engl.; 6, *Saxifraga sp.*; 7, *Saxifraga Jacquemontiana*, Dcne.; 8, *Saxifraga Jacquemontiana*, Dcne.

Fig. 6. Saxifraga sp.

Flowers.—June, July.
Locality.—Above Mitsahoi (Hallberg).

Figs. 7 and 8. Saxifraga Jacquemontiana, Dcne.

Densely tufted. Caudicles almost woody, short, $\frac{4}{5}$-$1\frac{1}{5}$ in. long, densely leafy, ending in short, $\frac{1}{12}$-$\frac{1}{8}$ in. long, 1-flowered stems. Lower leaves $\frac{1}{8}$-$\frac{1}{4}$ in. long, rounded or elliptic, almost hairless; upper leaves glandular-hairy or nearly hairless; uppermost leaves inversely egg-shaped-oblong. Flowers stalkless or almost so. Sepals egg-shaped-oblong, spreading, about $\frac{1}{8}$ in. long, $\frac{1}{16}$ in. broad, many-nerved, glandular-hairy. Petals twice as long as the sepals, yellow, inversely egg-shaped or broadly elliptic, about $\frac{1}{4}$ inch long, $\frac{1}{8}$-$\frac{1}{6}$ in. broad. Stamens more than half the length of the petals. Capsule egg-shaped-globose, crowned by the short, divergent styles. Seeds very small, ellipsoidal, smooth.
Flowers.—August.
Locality.—Top of Aporwat on stony ground, about 13,000 ft., common; above Zoji La.
Distribution.—Alpine and subalpine Himalaya, from Kashmir to Sikkim, 13,000-18,000 ft.

Plate 23

Fig. 1. Saxifraga flagellaris, Willd., subsp. **euflagellaris,** Engl. and Irmsch.

Stems $\frac{2}{5}$-6 in. long, 2-7-flowered. Runners hairless or with here and there a glandular hair. Basal leaves inversely egg-shaped-oblong or inversely lance-shaped, the margin first with glandular hairs, or simply hairy after the loss of the glands; stem-leaves lance-shaped, margin and blade densely glandular-hairy. Flowers short-stalked. Sepals oblong, blunt, about $\frac{1}{8}$ in. long, $\frac{1}{25}$-$\frac{1}{12}$ in. broad. Petals inversely egg-shaped or inversely egg-shaped-oblong or oblong, about $\frac{1}{8}$ in. long, $\frac{1}{8}$-$\frac{1}{4}$ in. broad, 3-nerved, yellow with red lines near the base. Ovary egg-shaped. Styles almost erect.
Flowers.—June, July.
Locality.—Above Zoji La; Gilgit; Baltistan, Khorbula Mullah, 7,600-16,000 ft.; Ladakh.
Distribution.—Arctic regions, subarctic and Central Asia, alpine and subalpine Himalaya, from Kashmir to Sikkim, up to 20,000 ft., Caucasus, Rocky Mountains.

Figs. 2 and 4. Saxifraga flagellaris, Willd., subsp. **mucronulata,** Engl. and Irmsch.

Stems 2-4 in. high, 4-10-flowered. Runners red, more or less densely glandular-hairy. Basal leaves lance-shaped, the margin first covered with glandular cartilaginous hairs, tip ending in a long persistent awn; stem-leaves lance-shaped or oblong-lance-shaped, margin and blade densely glandular-hairy, long-awned. Flowers almost stalkless. Sepals oblong, sharp-pointed, $\frac{1}{10}$ in. by $\frac{1}{25}$ in. Petals inversely egg-shaped-oblong, narrowed towards the base, $\frac{1}{4}$ in. by about $\frac{1}{10}$ in., 3-nerved, yellow, without red lines near the base. Ovary broadly egg-shaped.

Flowers.—July, August.

Locality.—Top of Aporwat, stony ground, above 13,000 ft., common; above Zoji La; above Kainmul; Liddar Valley, about 13,500 ft.

Distribution. — Alpine and subalpine Himalaya, from Kashmir to Sikkim, up to 19,000 ft.

Fig. 3. Saxifraga sp.

1-3 in. high.

Flowers.—July, August.

Locality.—Top of Aporwat, stony ground, above 13,000 ft., common (Mrs. Wathen).

Figs. 5 and 6. Saxifraga diversifolia, Wall. Collett, fig. 50.

Stems and flowering stems erect, 4 in. to $1\frac{1}{3}$ ft. long, hairless below, glandular-hairy above, many-, rarely few-flowered. Leaves polymorph; basal and lower stem-leaves more or less long-stalked, blade hairless or sparsely brown-hairy, egg-shaped, heart-shaped, $\frac{1}{16}$-$1\frac{2}{3}$ in. long, $\frac{1}{16}$-$1\frac{1}{3}$ in. broad; middle stem-leaves short-stalked or stalkless, egg-shaped or oblong. Branches of panicle $\frac{2}{3}$-$2\frac{1}{2}$ in. long or longer; flower-stalks usually longer than the flower. Sepals spreading or finally bent back, oblong or egg-shaped, shortly glandular-hairy on the margin, $\frac{1}{10}$-$\frac{1}{3}$ in. long, 3-nerved. Petals $1\frac{1}{2}$-2 times as long as the sepals, oblong or oval, yellow or pale yellow. Stamens by $\frac{1}{3}$ shorter than the petals. Capsule egg-shaped-globose, crowned by the slightly divergent styles.

Flowers.—August, September.

Locality.—Aporwat above Gulmarg amongst rocks in watercourses, above 10,000 ft., fairly common; above Zoji La.

Distribution.—Alpine and subalpine Himalaya, from Kashmir to Sikkim, Yunnan.

Saxifraga Meeboldii, Engl. and Irmsch.

Densely tufted. Caudicles columnar, $\frac{2}{5}$-$1\frac{3}{5}$ in. long, much-branched, densely leafy. Flowering stems short, $\frac{3}{5}$-1 in. long, with few leaves, 3-4-flowered at the top, covered with glandular hairs along the whole length. Leaves of caudicles leathery, keeled above, bent back at the tip, hairless, with short hairs only at the base, spoon-tongue-shaped, $\frac{1}{3}$-$\frac{1}{2}$ in. long, $\frac{1}{20}$-$\frac{1}{16}$ in. broad, with 3, rarely 5, pits and minute calcareous scales in the bent back part; stem-leaves inversely egg-shaped, $\frac{1}{25}$-$\frac{1}{16}$ in. long, without pits. Branches of inflorescence 1-flowered, $\frac{1}{3}$-$\frac{1}{2}$ in. long, densely clothed with glandular hairs. Sepals in flower erect, oblong, $\frac{1}{16}$-$\frac{1}{14}$ in. long, about $\frac{1}{24}$ in. broad, with 3 parallel nerves. Petals oblong-inversely egg-shaped, $\frac{1}{3}$-$\frac{1}{2}$ in. long, about $\frac{1}{24}$ in. broad, twice as long as the sepals, yellow. Stamens longer than the petals. Styles up to $\frac{1}{3}$ in. long, erect in flower, divergent in fruit.

Flowers.—July.

Locality.—Gilgit, on rocks, about 11,000 ft.

Distribution.—Alpine and subalpine W. Himalaya.

Saxifraga ramulosa, Wall.

Densely tufted. Stems 2-6 in. long, branches crowded into tufts. Branches barren or producing a flowering stem, terminated by rosulate crowded leaves. Flowering stems short, $\frac{1}{3}$-$\frac{2}{3}$ in. long, laxly leafy, 1-2-flowered, shortly grandular-hairy. Leaves of caudicles rigid, spreading horizontally or bent, linear-oblong or linear-spoon-shaped, $\frac{1}{4}$-$\frac{2}{3}$ in. long, only towards the base shortly ciliate, along the margin a series of 5-9 pits; stem-leaves much smaller, linear or oblong, $\frac{1}{12}$-$\frac{1}{8}$ in. long. Flower-stalks short, hairy like the stem. Sepals almost erect, oblong or oblong-egg-shaped, $\frac{1}{10}$-$\frac{1}{4}$ in. long, with a very narrow cartilaginous margin, 3-5-nerved, margin and back glandular-hairy. Petals inversely egg-shaped, about $\frac{1}{3}$ in. long, more than twice as long as the sepals, 3-nerved. Stamens $\frac{1}{2}$ as long as the petals. Ovary broadly egg-shaped, glandular-hairy. Capsule egg-shaped to almost rounded, $\frac{1}{8}$ in. long, supported by the erect-spreading sepals.

This species resembles *S. imbricata*, but can be distinguished by the stalked flowers and more glandular-hairy sepals.

Locality.—Alpine and subalpine region.

Distribution.—Alpine and subalpine Himalaya, from Kashmir to Sikkim, up to 18,000 ft.

Saxifraga imbricata, Royle.

Very densely tufted. Caudicles $\frac{4}{5}$-$1\frac{1}{5}$ in. long, $\frac{1}{8}$-$\frac{1}{4}$ in. broad, erect or ascending, much-branched, densely leafy. Flowering stems very short, 1-flowered. Leaves of caudicles numerous, more or less bent back at the tip, lower margin hairy, inversely egg-shaped-oblong, $\frac{1}{12}$-$\frac{1}{6}$ in. long, with one deep pit and calcareous scale near the tip. Sepals egg-shaped, almost erect, up to $\frac{1}{12}$ in. long and $\frac{1}{20}$ in. broad, on the margin shortly glandular-hairy, 3-5-nerved, the middle nerve near the tip with a pit. Petals inversely egg-shaped or oblong-inversely egg-shaped, $\frac{1}{6}$-$\frac{1}{5}$ in. long, tip spreading, 3-nerved, white. Stamens $\frac{1}{2}$ the length of the petals; anthers violet. Carpels oblong, scarcely united. Styles very short; stigmas small.

Locality.—Karakoram, Bradloh Valley, 8,000-10,000 ft.; Baltistan, above Dras, 10,000 ft.

Distribution. — Alpine and subalpine Himalaya, from Kashmir to Sikkim, up to 17,000 ft.

Saxifraga Duthiei, Gandoger.

Very densely tufted. Caudicles with the leaves densely arranged in 4 rows. Flowering stems 1-flowered. Leaves of caudicles opposite, egg-shaped, hooded, hairless, on the margin dotted. Sepals egg-shaped, thinly glandular-hairy. Petals narrowly inversely egg-shaped, almost twice the length of the sepals, pale rose-coloured. Filaments of stamens and styles almost as long as the petals.

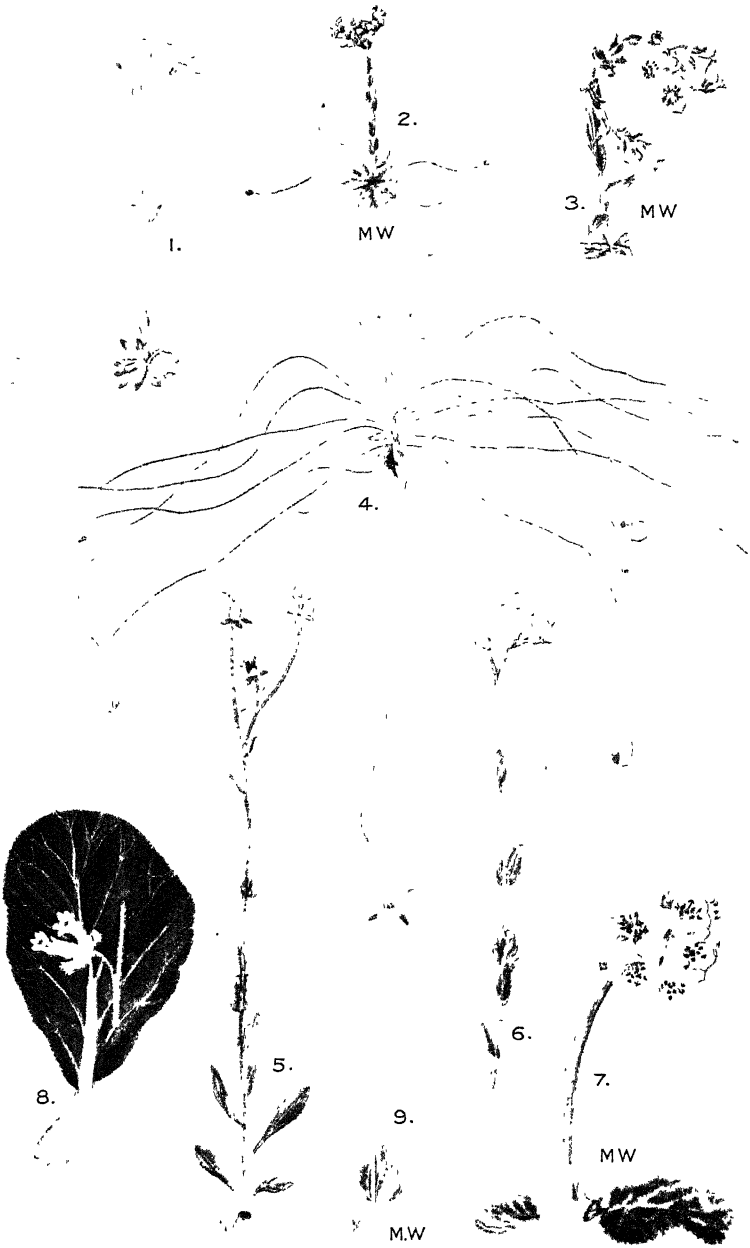
Locality.—Baltistan, about 10,000 ft. Apparently endemic.

Saxifraga oppositifolia, Linn., subsp. **asiatica**, Engl. and Irmsch.

Stems 1-2 in. long, much-branched and crowded, forming dense tufts. Rosulate leaves $\frac{1}{6}$-$\frac{1}{5}$ in. long, inversely egg-shaped, hairless, or the upper ciliate. Flowering stems from the ends of the branches, $\frac{1}{2}$-2 in. long with opposite leaves or sometimes alternate. Sepals egg-shaped-oblong, nearly hairless, erect in fruit, united with the ovary at the base, $\frac{1}{8}$-$\frac{1}{6}$ in. long. Petals inversely egg-shaped, $\frac{1}{8}$-$\frac{1}{2}$ in. long, 5-nerved, deep rose-coloured. Seeds ellipsoid, finely wrinkled, warty.

Locality.—Alpine and subalpine region.

Distribution.—Siberia, Turkestan, Tibet, Kashmir.



FIGS.—1, *Saxifraga flagellaris*, Willd., subsp. *euflagellaris*; 2, *Saxifraga flagellaris*, Willd., subsp. *mucronulata*; 3, *Saxifraga sp.*; 4, *Saxifraga flagellaris*, Willd., subsp. *mucronulata*; 5, *Saxifraga diversifolia*, Wall.; 6, *Saxifraga diversifolia*, Wall.; 7, *Bergenia ligulata*, Engl.; 8, *Bergenia*

BERGENIA, Moench.

I. Base of leaves heart-shaped. Fruit almost round.
 1. Leaves hairless on both surfaces ... *B. ligulata.*
 2. Leaves hairy on both surfaces ... *B. ciliata.*

II. Base of leaves scarcely heart-shaped. Fruit egg-lance-shaped... *B. Stracheyi.*

Fig. 7. Bergenia ligulata, Engl. Coventry pl. XX.

A perennial herb. Rootstock stout, woody. Leaves 2-10 in. diameter, round, heart-shaped, undivided, entire, with the margins fringed with hairs, hairless on both surfaces, base of leaf-stalk sheathing. Flowering stems leafless, thick, usually reddish, up to 1 ft. high. Flowers 1-1½ in. diameter, white or pale rose-pink forming a many-flowered corymb or one-sided panicle, flower-stalks hairless. Sepals attached to the ovary, hairless, lobes erect in fruit. Petals 5, rounded. Stamens 10. Carpels 2, sometimes 3, with very long styles. Fruit almost round.

Flowers.—March to July.

Locality.—Near Shirazia Bagh, in small hollows; Aporwat, big rocks near nalas, above 10,000 ft., common; at elevations of 7,000-10,000 ft. usually growing in masses on rocks, Gulmarg and throughout the valley (Coventry).

Distribution. — Temperate Himalaya, from Kashmir to Bhutan, Khasia Hills, 4,000 ft.

Bergenia ciliata, Blatter (= Saxifraga ciliata, Royle).

A perennial herb. Rootstock very stout. Stems short, thick, fleshy, procumbent. Leaves egg-shaped or round, 2-6 in. long at the time of flowering, in the autumn attaining 12 in. or more and turning bright red, heart-shaped, entire, fringed with short stiff hairs, both surfaces hairy, becoming almost hairless in age. Stalk sheathing at the base. Flowers white, pink or purple, 1¼ in. diameter, forming a spreading cymose panicle. Flowering stem flexible, leafless, 4-10 in. long. Styles long.

Flowers.—May.

Locality.—Gadsar, on rocks.

Distribution.—Temperate Himalaya, from Kashmir to Nepal, 6,000-8,000 ft.

Fig. 8. Bergenia Stracheyi, Engl.

A perennial herb with a stout woody rootstock. Leaves egg-shaped or inversely egg-shaped, 2-4 in. at the time of flowering, later on attaining up to 12 in., scarcely heart-shaped, margins either almost entire, ciliate or toothed, both surfaces hairless. Stalk sheathing nearly along its whole length. Flowering stems leafless, up to 1 ft. high. Flowers 1¼ in. diameter, white or rose. Flower-stalks hairy. Calyx hairy, teeth oblong, often wider above their base. Fruit egg-lance-shaped with long styles. Fruit-stalks usually erect.

Flowers.—June, July.

Locality.—Below Lal Shah ki Alam, 11,000 ft.; Damam Sar, 13,500 ft.; Gangabal.

Distribution.—W. Himalaya, from Kashmir to Kumaon, 8,000-14,000 ft.

PARNASSIA, Linn.

I. Staminodes (barren stamens), 3-lobed ... *P. nubicola.*
II. Staminodes ending in many long gland-bearing processes *P. palustris.*

Fig. 9. Parnassia nubicola, Wall. Collett, fig. 51.

A glabrous perennial herb. Leaves radical, long-stalked, egg-shaped or oblong-egg-shaped, heart-shaped, 1-2-3 in., entire, sharp-pointed. Flowering stems erect, 4-18 in. high, with a stalkless leaf about the middle and a solitary white flower about 1 in. diameter at the top. Calyx-tube short, attached to the base of the ovary; lobes 5, blunt. Petals 5, entire or slightly jagged. Stamens 5; staminodes (barren stamens) 5, fleshy, flattened, 3-lobed. Ovary egg-shaped, 1-celled. Style very short or absent. Ovules many. Capsule ½ in. long. Carpels usually 3, but 4 are frequent, and 5 have been observed.

Flowers.—August, September.

Locality.—Above Gulmarg in short grass on hill-slopes, about 10,000 ft.

Distribution. — Temperate and alpine Himalaya, from Kashmir to Sikkim, 6,000-12,000 ft.

Parnassia palustris, Linn. Grass of Parnassus, White Buttercup, White Liverwort.

A delicate herb. Radical leaves stalked, heart-shaped. Flowering stems few, slender, up to 10 in. high, erect or wavy, angular, bearing a single stalkless clasping leaf halfway up the stem. Flowers of a cream or white colour, large. Sepals free, blunt. Petals egg-shaped-elliptic veined, with a broad

claw, sweet-scented in sunshine and losing its scent at night. Stamens 5. Staminodes 5, crowned by as many as 17 yellow globular glands, resembling honey, but dry. Carpels 4. Capsule oblong-elliptic, much longer than the sepals, membranous, many-seeded.

Locality.—Baltistan.

Distribution.—North temperate zone of Europe, N. Africa, Siberia, W. Asia, as far east as N.W. Himalaya, 7,500 ft., E. and W. North America.

Plate 24

CRASSULACEAE. The Stonecrop Family.

SEDUM, Linn. The Stonecrop.

A. Flowers white.
 I. Petals sharp-pointed, white, often striped with pink *S. adenotrichum.*
 II. Petals not sharp-pointed, white ... *S. rosulatum.*
B. Flowers yellow.
 I. Seeds not compressed.
 1. Follicles (parts of fruit) 5, erect in fruit *S. Jaeschkei.*
 2. Follicles 3-5, spreading in fruit *S. multicaule.*
 II. Seeds compressed.
 1. Styles recurved in fruit ... *S. Rhodiola.*
 2. Styles not recurved in fruit ... *S. asiaticum.*
C. Flowers rose-purple, or rose, or red, or pink.
 I. Seeds not compressed *S. Ewersii.*
 II. Seeds compressed.
 1. Styles recurved in fruit.
 a. Cymes 4 - 20 - flowered. Flowers rose or purple *S. tibeticum.*
 b. Cymes 5 - 1 - flowered. Flowers red *S. quadrifidum.*
 2. Styles not recurved in fruit. Flowers pink *S. trifidum.*
D. Flowers black-purple *S. elongatum.*

Fig. 1. Sedum adenotrichum, Wall. Collett, fig. 54.

A glandular-hairy plant. Stems 3-10 in. high, nearly erect. Radical leaves rosulate, ½-1½ in. long, stalkless, spoon-shaped or elongate- inversely egg-shaped. Stem-leaves few, distant, about ¼ in. long, oblong, narrowed below. Flowers white, often striped with pink, forming loose cymes. Flower-stalks ¼-1 inch long. Sepals oblong, minutely hairy. Petals lance-

shaped, sharp-pointed. Follicles erect. Seeds inversely egg-shaped, ellipsoid, smooth, longitudinally streaked.

Flowers.—April, May.

Locality.—On stones along streams near Sarban Lake; Gagribal; near Shirazia Bagh; Dachigam.

Distribution.—W. Himalaya, from Kashmir to Kumaon, 3,000-8,000 ft.

Sedum rosulatum, Edgew.

A glandular-hairy or hairless herb. Stems nearly erect, 2-4 in. high. Radical leaves rosulate, ¼-1½ in. long, spoon-shaped or elongate- inversely egg-shaped. Stem-leaves few, distant, ⅛-⅜ in. long, spoon-shaped to inversely egg-shaped or spoon-shaped-rounded. Flowers white, long-stalked, ⅛ in. long, in open loose cymes. Sepals oblong, hairless, rarely minutely hairy. Petals elliptic or oblong, not sharp-pointed. Follicles small, erect. Seeds ellipsoid, somewhat inversely egg-shaped, longitudinally streaked.

Flowers.—April-June.

Locality.—At altitudes of 5,000-7,000 ft.

Distribution.—Afghanistan, W. Himalaya, from Kashmir to Kumaon, 5,000-9,000 ft.

Fig. 2. Sedum Jaeschkei, Kurz.

An annual herb. Branches 4-5 in. or less, crowded, simple, or branched from the base. Lower leaves usually densely rosulate, spoon-shaped-oblong, sharp-pointed. Stem-leaves scattered, smaller, narrower, or crowded towards the end of the branches. Flowers large, nearly ½ in. long, solitary at the end of the branches or crowded in dwarf specimens, golden yellow. Segments of calyx ¼-½ in. long, green, fleshy, similar to and often larger than the leaves. Petals double the sepals. lance-shaped, blunt. Stamens less than half as long as the petals. Follicles 5, erect in fruit.

Flowers.—August.

Locality.—Aporwat above Gulmarg on stony hill-tops, about 13,000 ft., common; Nil Nag.

Distribution.—W. Himalaya.

Sedum multicaule, Wall.

A glabrous plant. Stems usually several, nearly erect, 3-8 in. high, usually much divided from the base. Leaves ½-1 in. long, nearly stalkless, cylindric, sharp-pointed; radical and stem-leaves usually numerous. Flowers almost stalkless, yellow, ¼ in. long in bud. Branches of cyme long, racemose, leafy. Carpels not warty. Seeds inversely egg-shaped covered with very small warts.



FIGS.—1, *Sedum adenotrichum*, Wall.; 2, *Sedum Jaeschkei*, Kurz.; 3, *Sedum Ewersii*, Ledeb.; 4, *Sedum quadrifidum*, Pall.; 5, *Sempervivum mucronatum*, Edgew.; 6, *Sempervivum sedoides*, Dcne.

Flowers.—July, August.
Locality.—Temperate region.
Distribution. — Temperate Himalaya from Kashmir to Bhutan, 4,000-7,000 ft., China, Japan.

Sedum Rhodiala, DC. Orpine Stonecrop, Roseroot.

A bluish-green perennial herb. Rootstock thick, smelling of roses, almost erect, with a crown of scales, from the axils of which rise the annual stems. Stems simple, leafy, 3-15 in. high, thick. Leaves ½-1½ in. long, inversely egg-shaped or broadly oblong, toothed towards the tip. Cymes densely congested, at the end of the stems. Flowers yellow, the parts in fours, male and female flowers on different plants. Sepals narrow, oblong. Petals linear, smaller, or wanting in the female flowers. Stamens 8. Styles recurved in fruit. Carpels in fruit ⅕ in. long, not narrowed gradually at the base. Seeds oblong-ellipsoid, compressed.
Flowers.—June.
Locality.—Near Shirazia Bagh, on hill in rocky and gravelly soil.
Distribution. — Alpine W. Himalaya, from Kashmir to Kumaon, 12,000-17,000 ft., arctic and alpine regions of Europe and America.

Sedum asiaticum, DC.

A perennial herb, hairless, or the branches of the cyme minutely hairy. Rootstock woody. Stems 6-12 in. high. Leaves 1-1½ in. long, linear, distantly toothed. Cymes dense. Flowers yellow. Sepals half as long as the petals. Petals lance-spoon-shaped. Follicles narrow, oblong-lance-shaped. Style nearly straight, not recurved. Seeds ellipsoid, compressed.
Flowers.—June, July.
Locality.—Below the Lal Shah ki Alam ridge, 11,000 ft.; Khur Mt. on rocks, 13,500 ft.
Distribution.—Alpine Himalaya, from Kashmir to Sikkim, 11,000-16,000 ft.

Fig. 3. Sedum Ewersii, Ledeb. Coventry pl. XXI.

A perennial hairless herb. Stems erect, with the lower portion sometimes trailing, 4-12 in. high. Leaves opposite or some of the upper ones alternate, stalkless, rounded, fleshy, bluish-green, entire or with the margin slightly wavy, ½-1 in. diameter, few or no radical leaves. Flowers ¼-⅓ in. diameter, rose-pink or rose-purple, forming dense many-coloured cymes. Calyx 5-parted. Petals 5, free, spreading horizontally (star-shaped). Stamens 10; filaments rose-purple; anthers almost

black. Fruit a cluster of 5 erect follicles. Seeds inversely egg-shaped, not compressed.

Flowers.—June to September.

Locality.—Gangabal; Aporwat; Sonamarg; at altitudes of 8,000-12,000 ft.

Distribution. — Temperate and alpine Himalaya, from Kashmir to Kumaon, alpine Siberia, Soongaria.

Sedum tibeticum, Hook. f. & T. Tibetan Stonecrop.

A hairless perennial herb. Rootstock stout, almost erect, with a crown of scales from the axils of which arise the annual stems. Stems 4-10 in. high, simple, leafy. Leaves $\frac{1}{3}$-$\frac{1}{2}$ in. long, almost entire, oblong or egg-shaped-oblong, the lower often egg-shaped. Cymes 4-20-flowered, not very dense in fruit. Flowers rose or purple, often of 5 parts. Sepals in fruit triangular-long-pointed. Follicles $\frac{1}{3}$ in. long, not narrowed gradually at the base. Style recurved. Seeds oblong-ellipsoid, compressed.

Locality.—At elevations of 12,000-16,000 ft.

Distribution. — Alpine W. Himalaya, from Kashmir to Kunawer, Afghanistan.

Fig. 4. Sedum quadrifidum, Pall.

A perennial herb. Rootstock stout, almost erect, with a crown of scales from the axils of which arise the annual stems. Stems 2-5 in. high, many, hairless, or slightly hairy. Leaves $\frac{1}{4}$ in. long, oblong, nearly cylindrical, hairless or slightly hairy, sometimes very sharp-pointed. Cymes 5-1-flowered. Flowers red, often of 4 parts. Sepals oblong. Follicles with short styles which are usually recurved, but sometimes erect, straight. Seeds oblong-ellipsoid, compressed.

Flowers.—June, July.

Locality.—Aporwat above Gulmarg, stony hill-tops, about 13,000 ft. common; Basam Gali, below Pass; Khur Mt., 13,000-13,500 ft., abundant, but not on rocks.

Distribution.—Alpine Himalaya, from Kashmir to Kumaon, 11,000-18,000 ft., Sikkim, 16,000-18,000 ft., arctic Russia and Siberia.

Sedum trifidum, Wall.

A hairless perennial. Stems erect, 3-12 in. high. Leaves 1-4 in. long, strap-shaped, tapering to a stalkless base, 3-5-lobed, lobes spreading, unequal, $\frac{1}{4}$-1 in. long, blunt, entire or sometimes toothed. Flowers pale pink, stalked, $\frac{1}{4}$ in. long in bud, crowded in leafy cymes. Sepals narrow-lance-shaped. Petals linear-lance-shaped, twice as long as the sepals. Follicles narrow, oblong-lance-shaped. Style slender, not recurved. Seeds ellipsoid, compressed. When withering the whole plant turns crimson.

Locality.—Temperate regions, on rocks and trees.

Distribution.—Temperate Himalaya, from Kashmir to Sikkim, 6,000-12,000 ft.

Sedum elongatum, Wall.

A hairless perennial herb. Rootstock stout, almost erect, with a crown of scales from the axils of which arise the annual stems. Stems 8-20 in. high. Leaves ¾-2 in. long; oblong, narrowed at the base, almost stalkless, or elliptic, stalkless. Cymes large, loose, slightly hairy. Flowers black-purple. Sepals linear-lance-shaped. Petals lance-shaped. Follicles almost ¼ in. long. Styles recurved in fruit. Seeds oblong-ellipsoid, compressed.

Locality.—Alpine regions.

Distribution.—Alpine Himalaya, from Kashmir to Sikkim, 10,000-12,000 ft.

SEMPERVIVUM, Linn.

A. Leaves 1-2½ in. long.
 I. Flowers white *S. mucronatum.*
 II. Flowers purple-rose *S. acuminatum.*
B. Leaves ½-¾ in. long... *S. sedoides.*

Fig. 5. Sempervivum mucronatum, Edgew.

A fleshy herb. Stems 2-6 in. high. Radical leaves forming a rosette, 1-1½ in. long, lance-shaped, mucronate (abruptly pointed by a sharp spine), hairs on the edge or hairless. Stem-leaves stalkless, oblong-lance-shaped, more or less hairy. Flowers white, forming a somewhat dense cyme. Sepals glandular-hairy, oblong-lance-shaped, long-pointed. Petals scarcely twice as long as the sepals. Follicles many-seeded. Seeds narrowly inversely egg-shaped, streaked longitudinally, scarcely half as big as in the following species.

Flowers.—July.

Locality.—Sind Valley, on gravel.

Distribution.—Alpine Himalaya, from Kashmir to Kumaon, 10,000-12,000 ft.

Sempervivum acuminatum, Dcne.

A fleshy perennial herb. Stems 4-8 in. high. Radical leaves forming a rosette, 1-2½ in. long, hairless, inversely egg-lance-shaped or nearly linear, mucronate (abruptly pointed by a sharp spine). Stem-leaves ½-¾ in. long, stalkless, oblong, long-pointed. Flowers purple-rose, forming somewhat loose cymes. Flower-stalks hairless or slightly hairy. Sepals oblong-lance-shaped, long-pointed, scarcely hairy. Petals hairless, 2-3 times as long as the sepals. Seeds narrow, inversely egg-shaped, longitudinally streaked.

Locality.—Alpine regions.
Distribution.—Alpine Himalaya, from Kashmir to Kunawer, 10,000-15,000 ft.

Fig. 6. Sempervivum sedoides, Dene.

A fleshy perennial herb. Stems annual, erect, leafy, 2-3 in. high. Leaves fleshy, nearly hairless, stalkless, oblong-egg-shaped, blunt, entire. Radical leaves forming a rosette, ½-¾ in. long. Stem-leaves alternate, ⅓-½ in. long, overlapping. Flowers white, slightly hairy, ⅓ in. long, forming a crowded cyme. Calyx 8-lobed to the base; lobes sharp-pointed. Petals 8, nearly twice the length of the sepals. Stamens 16. Carpels 8, hairy. Ovules many. Seeds narrowly ellipsoid, longitudinally streaked.
Flowers.—July.
Locality.—Gangabal, on rocks; Pir Panjal.
Distribution.—W. Himalaya, from Kashmir to Garhwal.

Plate 25

ONAGRACEAE.

EPILOBIUM, Linn. Willow Herb.

A. Flowers irregular. Stamens bent down on one side.
 I. Leaves without a net-work of veins — *E. latifolium.*
 II. Leaves with a net-work of veins — *E. angustifolium.*
B. Flowers regular. Stamens erect.
 I. Stigmas distinct, spreading... ... — *E. hirsutum.*
 II. Stigmas combined, club-like.
 1. Leaves linear-lance-shaped ... — *E. cylindricum.*
 2. Leaves not linear-lance-shaped.
 a. Leaves egg-shaped or egg-shaped-oblong or oblong.
 i. Leaves stalked. Flowers rose-coloured — *E. roseum.*
 ii. Leaves stalkless or very short-stalked.
 A. Hairy lines down the stem strongly marked — *E. amplectens.*
 B. Hairy lines down the stem not strongly marked — *E. origanifolium.*
 b. Leaves lance-shaped.
 i. Leaves wedge-shaped at the base. Flowers rose or lilac — *E. palustre.*
 ii. Leaves tapering at both ends. Flowers pale-pink — *E. Royleanum.*

Fig. 1. **Epilobium latifolium**, Linn.

A herb, up to 1 ft. high and mostly hairless. Leaves 1½-3 by ¼-¾ in., scattered and opposite, oblong, narrowed at both ends, hairless or very slightly hairy, entire or indistinctly toothed, blunt, rarely somewhat pointed. Flower-stalks distant in the axils of leaves, irregular. Calyx-segments 4, broadly lance-shaped, long-pointed, purplish, free to the base. Petals ⅛-⅝ in. long, rose-purple, inversely egg-shaped. Stamens bent down on one side. Ovary 4-celled. Style cylindric, with a few scattered hairs above the base. Stigmas 4, distinct, spreading. Capsule linear, 3 in. long, 4-celled, closely hairy. Seeds many, inversely egg-shaped, smooth, crowned by long silky tawny yellow hairs.

Flowers.—July, August.

Locality.—Tosh Maidan, W. slope of ridge; below Kolohoi glacier, stony ground between streams, about 12,000 ft.

Distribution.—Alpine W. Himalaya, from Kashmir to Kumaon, 11,000-14,000 ft., Dahuria, Altai, arctic Asia, Europe, America.

Fig. 2. **Epilobium angustifolium**, Linn. Rosebay, Bay-willow, Blood Vine, Cat's Eyes.

A tall, erect, much-branched herb, 2-4 ft. high, hairless or nearly so. Leaves many, 4-6 by ¾ in., scattered, narrow, lance-shaped, veined, almost stalkless, with a white mid-rib and whitish under side, the margin finely toothed. Flowers purple or rose-purple, irregular, in a spike which is soon naked. Calyx-segments lance-shaped, long-pointed, purplish, free to the base, tube covered with white hairs. Petals ½-⅝ in. long, inversely egg-shaped. Stamens bent down on one side. Style somewhat hairy above the base; stigmas 4, distinct, spreading. Capsule 2½-3½ in. long, hairy. Seeds smooth, oblong, brown, with a tuft of long white silky hairs at the upper end.

Flowers.—July, August.

Locality.—Gulmarg, steep rocky hill-sides, above 7,000 ft., common; Baltistan.

Distribution.—Temperate W. Himalaya, from Kashmir to Garhwal, 8,000-12,000 ft.; W. Asia, Europe, N. America.

Fig. 3. **Epilobium amplectens**, Benth.

Stem 6 in. to 2 ft. high, 4-angled with crisped hairs on the angles. Leaves at the middle of the stem, opposite, usually stalkless, oblong or narrow-elliptic, hairless, but with crisped hair on the raised nerves beneath, finely toothed, rarely sharp-pointed, somewhat rounded at the base, bases of the leaves

meeting and running down the stem in two hairy lines. Flowers in the axils of the leaves and solitary, in racemes or spikes towards the end of the branches, purple, regular or irregular. Calyx-lobes linear, teeth 4, lance-shaped, with crisped hair on the margins and bases. Petals 4, inversely egg-shaped, slightly depressed at the tip. Ovary 4-celled. Fruit 2-4 in. long, linear. Seeds narrowly elliptic, not narrowed at the summit, very little narrowed at the base, with a tuft of tawny hairs.

Distinguished from *Epilobium origanifolium* by the hairy lines down the stem being strongly marked.

Flowers.—July.

Locality.—Gangabal.

Distribution.—Kashmir, Kumaon, Lonok, Tibet, Sikkim, 10,000-14,000 ft.

Epilobium hirsutum, Linn. Great Hairy Willow Herb, Coddled Apple, Apple-pie, Blooming Sally.

An erect, robust herb, densely clothed with soft white hairs, 2-6 ft. high, cylindric except near the base, usually branched. Middle stem-leaves opposite or alternate, stalkless, stem-clasping, lance-shaped, 1-3 by ¼-½ in., softly hairy on both sides, teeth small, sharp. Flowers pink-purple, ½ in. long. Sepals green, oblong. Petals ⅝ in. long. Stigmas 4, distinct, at first erect, ultimately spreading. Capsule 1½-3½ in. long. Seeds ellipsoid or inversely egg-shaped, 2½ times as long as broad, tipped with a tuft of long hairs.

Flowers.—July.

Locality.—Srinagar, in moist places.

Distribution.—Temperate W. Himalaya, from Kashmir to Kumaon, 5,000-7,000 ft., Europe, Africa, Asia.

Epilobium cylindricum, Don.

A pubescent herb. Stems erect or ascending, often with distinct hairy lines, cylindric or obscurely angular, 1-3 ft. high. Leaves stalkless or short-stalked, linear-lance-shaped, 1-2½ by ¼ in., tapering to a fine point; teeth small, sharp; both surfaces nearly hairless, lower paler. Racemes many, axillary. Flowers pale-pink, less than ¼ in. long. Stigmas combined, club-like. Capsule 1½-2½ in. long, long-stalked. Seeds inversely egg-shaped, warty.

Flowers.—August, September.

Locality.—Temperate region.

Distribution.—Temperate Himalaya, from Kashmir to Sikkim, 6,000-10,000 ft.

Epilobium roseum, Schreb. Rose Willow Herb.

A perennial herb. Stems up to 2 ft. high, brittle, usually hairy all round, sometimes with 4 well-marked lines. Middle stem-leaves 1-2 in. long, opposite, sometimes 3 at the same level, egg-shaped, oblong, narrow above and below, smooth, toothed; stalk often less than $\frac{1}{8}$ in. long, but sometimes nearly $\frac{1}{4}$ in. Flowers numerous, rose-coloured. Sepals lance-shaped with a long, narrow point. Stigmas entire, or very slightly lobed. Capsule downy. Seeds inversely egg-shaped, oblong, minutely warty, the base rounded.

Locality.—Temperate region, Baltistan.

Distribution.—Temperate W. Himalaya, from Kashmir to Kumaon, 5,000-11,000 ft., W. Asia, Europe.

Epilobium origanifolium, Lam.

Very variable as to the size of stem, leaves, and flowers. Stem generally 8 in. high, sometimes reaching 2 ft., usually with 2 hairy lines, sometimes quite round in section and uniformly hairy. Middle stem-leaves opposite, stalkless or very short-stalked, usually 1 in. long, egg-shaped, or egg-shaped-oblong, hairy only on the slightly-raised nerves beneath. Flowers usually few towards the end of the branches. Petals usually less than $\frac{1}{4}$ in. Capsule $1\frac{1}{2}$-3 in. long; fruit-stalk very variable in length. Seeds elongate, narrow- inversely egg-shaped, somewhat narrowed at the tip.

Locality.—In the alpine region.

Distribution.—Alpine Himalaya, from Kashmir to Sikkim, 9,000-14,000 ft., northern cool temperate and arctic zone.

Epilobium palustre, Linn. Marsh Willow Herb.

A herbaceous perennial. Stem 8-10 in. high having a cord-like base, roots near the base, round in section, with 2 lines of felt. Leaves stalkless, lance-shaped, nearly all opposite, limp, spreading, with few teeth, tip narrow, blunt, wedge-shaped at the base, hairless or nearly so. Flowers in a raceme, nodding at the top, rose or lilac. Buds blunt, nodding. Sepals lance-shaped. Capsule downy, 2 in. long. Seeds inversely egg-shaped, not narrowed upwards, as is the case in the European plant.

Locality.—Northern Kashmir, Baltistan, 8,000-14,000 ft.

Distribution.—Europe, N. Asia, America.

Fig. 4. Epilobium Royleanum, Haussk. (= **E. roseum**, Schreb. var. **Dalhousianum**, C. B. Clarke.) Collett, fig. 58.

A pubescent herb. Stems erect or ascending, pubescent all over, 1-3 ft. high, branched. Leaves thin, limp, stalkless, or the lower ones shortly stalked, lance-shaped, 1½-3 by ½-1 in., tapering at both ends, acute; teeth small, sharp; lower surface paler. Racemes numerous, axillary. Flowers pale pink, scarcely ¼ in. long. Stigmas combined, club-like. Capsule 1½-2 in. long.

Flowers.—July to October.

Locality.—Gulmarg, grassy margs, about 8,000 ft., common.

Distribution.—Temperate Himalaya, from Kashmir to Sikkim, 7,000-12,000 ft.

CIRCAEA, Linn. Enchanter's Nightshade.

I. Ovary 1-celled.	Seed 1	...	...	...	*C. alpina.*
II. Ovary 2-celled.	Seeds 2	...	...	...	*C. cordata.*

Fig. 5. Circaea alpina, Linn. Alpine Enchanter's Nightshade.

A hairless or slightly hairy perennial herb. Stems erect, 4-8 in. high. Leaves opposite, shining, deeply toothed, heart-shaped, ½-1 in. across, blunt or sharp-pointed or with a long narrow point, long-stalked. Flowers white or pinkish-white. Calyx hairless. Petals divided nearly to the base, shorter than the sepals. Ovary 1-celled. Capsule very small, less than ⅛ in., sometimes almost hairless, sometimes with many hooked hairs.

Flowers.—July.

Locality.—Mekhowali, in nala, 9,000 ft.; Sonamarg, forest.

Distribution.—Temperate Himalaya, from Kashmir to Sikkim, 7,000-11,000 ft; Khasia Hills, 4,500-6,000 ft.; Nilgiris and Pulney Hills, 7,000 ft., the temperate N. hemisphere.

Circaea cordata, Royle.

A perennial herb. Stems 1-2 ft. high, hairy. Leaves 3-4 by 1½-2 in., egg-lance-shaped, heart-shaped, long-pointed, more or less hairy. Leaf-stalk often 1½ in. long. Flowers white. Fruit scarcely ⅛ in., broad-elliptic, little longer than broad, covered with long hooked hairs, not shorter than the fruit-stalk, 2 celled, each cell with 1 seed.

Flowers.—August, September.

Locality.—At elevations of 7,000-8,000 ft.

Distribution.—W. Himalaya, from Kashmir to Chamba, 7,000-9,000 ft., N. China, Japan.



FIGS.—1, *Epilobium latifolium*, Linn.; 2, *Epilobium angustifolium*, Linn.; 3, *Epilobium amplectens*, Benth.; 4, *Epilobium Royleanum*, Haussk.; 5, *Circaea alpina*, Linn.; 6, *Trapa bispinosa*, Roxb.

TRAPA, Linn.

Fig. 6. Trapa bispinosa, Roxb. Singhara.

A floating herb. Stems long, flexuose, ascending in the water, the more submerged portions giving off at intervals pairs of comb-like spreading organs from below the scars of fallen leaves. Leaves floating, 2 by 2½-3 in., crowded in the upper part of the stem, often somewhat 3-lobed, usually very hairy and reddish-purple beneath, upper surface hairless, shining, dark green and often mottled with brown. Leaf-stalk with a spongy swelling below the blade. Flower-stalk short, reaching up to 4 in. in fruit. Calyx-tube short; limb of calyx 4-parted, 2 or all the segments changing into spines on the fruit. Petals 4, white. Stamens 4. Fruit bony, 1-celled, 1-1½ in. long and broad, dark brown, two opposite angles each with a spine, the two others sometimes obscure.

Flowers.—July.

Locality.—Nil Nag, in lake, 6,900 ft.; Dal Kutwal; common in many tanks and lakes.

Distribution.—Throughout India and Ceylon, S. E. Asia, tropical Africa.

Plate 26

UMBELLIFERAE.

CAUCALIS, Linn. The Parsley.

I. Bracts present.
 1. Rays of umbel 3-4 *C. latifolia.*
 2. Rays of umbel 5-12 *C. Anthriscus.*

II. Bracts absent *C. leptophylla.*

Fig. 1. Caucalis latifolia, Linn. Broad-leaved Parsley.

An annual herb, rough, almost prickly, 4 in. to 2 ft. high, erect or spreading, finely furrowed, round. The leaves have the lobes arranged each side of a common stalk, with leaflets divided nearly to the base, lance-shaped, coarsely toothed, the base running down to the stem. Flower-heads white or pink, in shortly-stalked umbels with 3-4 rays, 1-3 in. long. Flower-stalks hardly ¼ the length of the fruit. Bracts membranous. The fruits, with prickles in 2-3 rows, rough, 5-seeded.

Flowers.—May, June.

Locality.—Srinagar; near Shirazia Bagh; Gagribal.

Distribution.—Kashmir, 5,000-8,000 ft., Europe, temperate Asia.

Caucalis Anthriscus, Scop. Hedge Parsley, Hemlock Chervil, Rough Cicely, Lady's Needlework.

An annual herb. Stems branched, hard, woody, not hollow, 1-3 ft. high, finely furrowed, covered with turned-back hairs and having a roughish feel, purplish towards the base. Leaves much divided, twice pinnate, with lobes each side of a common stalk divided again, distant, spreading, with broad coarsely-toothed leaflets, the end-one linear-lance-shaped. The nodes are distant. Umbels compound, long-stalked. Bracts 1-5, linear, $\frac{1}{8}$-$\frac{1}{2}$ in. long. Rays 5-12, very unequal. Bracteoles (leaves at the base of the partial umbels) several, linear, sometimes longer than their umbels. Flowers many in an umbel, at first purple or red or pale pink, becoming white ultimately. Calyx-teeth none. Petals turned inwards at the point. Styles short, erect. Fruit egg-shaped, $\frac{1}{10}$ in. long, covered with rough, curved and usually minute-hooked bristles.

Flowers.—June, July.

Locality.—Temperate region.

Distribution.—Temperate Himalaya, from Kashmir to Sikkim, 3,000-9,000 ft., N. Asia, N. Africa, Europe.

Caucalis leptophylla, Linn.

This plant resembles *C. Anthriscus* very much, but the leaves are rather more finely cut, and the ultimate segments are narrower, sometimes almost linear. The umbels are often lateral; rays usually 2-5. There are no bracts. Fruit larger, $\frac{1}{6}$-$\frac{1}{4}$ in. long, bristles in 1-3 rows, longer, shining.

Locality.—At elevations of 4,000-6,000 ft.

Distribution.—Punjab, W. Asia, N. Africa, S. Europe.

PLEUROSPERMUM, Hoffm.

I. Leaves once pinnate. Fruit $\frac{1}{6}$ in. long.
 1. Bracteoles inversely egg-shaped... *P. Govanianum.*
 2. Bracteoles elliptic or oblong ... *P. Candollii.*

II. Leaves once or twice pinnate.
 1. Bracts 5-8. Rays 10-20. Fruit $\frac{1}{2}$ in. long *P. angelicoides.*
 2. Bracts 1-4. Rays 3-5. Fruit $\frac{1}{6}$ in. long *P. stellatum.*

III. Leaves twice pinnate. Rays 10-35. Fruit $\frac{1}{6}$ in. long. Bracts 4-6 ... *P. stylosum.*

IV. Leaves 3-4 times pinnate.
 1. Fruit $\frac{1}{5}$-$\frac{1}{4}$ in. long... *P. densiflorum.*
 2. Fruit $\frac{1}{8}$-$\frac{1}{6}$ in. long... *P. Brunonis.*

Fig. 2. Pleurospermum sp.

A small plant, 6-10 in. high, smelling strongly. Stem hollow.
Flowers.—June to August.
Locality. — Aporwat, grassy and rocky hill-sides, above 10,000 ft., not common (Mrs. Wathen).

Pleurospermum Govanianum, Benth.

Stem up to 1 ft. high, stout, hollow. Leaves 4-8 in. long, oblong, pinnate; pinnae ½-1½ in. long, toothed or pinnatifid. Bracts 1-3 in. long, of an oblong, entire, white-margined sheath with a divided often twice pinnate limb. Bracteoles inversely egg-shaped, toothed or almost pinnatifid at the tip. Umbels compound; rays many, 1-5 in. long; flower-stalks very many, short; partial umbels head-like, embraced by the bracteoles. Fruit ⅛ in. long, ellipsoid or almost quadrate, lateral ridges narrowest, furrows 1-vittate; outer coat very loose, glistening, netted. Seeds grooved on the inner face.
Locality.—Temperate regions.
Distribution.—Temperate and alpine W. Himalaya, from Kashmir to Garhwal, 10,000-15,000 ft.

Pleurospermum Candollii, Benth.

Stem up to 1½ ft. high, usually stout, hollow. Leaves 4-8 in. long, oblong, pinnate; pinnae ½-1½ in. long, toothed or pinnatifid, never finely cut. Bracts 0-3 in. long, often resembling reduced upper leaves, sometimes a mere sheath. Bracteoles elliptic or oblong, entire, embracing and usually overtopping the partial umbel. Flowers white. Umbels compound; rays many, 2-8 in. long, sometimes bearing scattered white elliptic bracts. Ovary dark purplish green. Fruit ⅛ in. long, ellipsoid, lateral ridges broadest, furrows 3-2-vittate.
Flowers.—July.
Locality.—Damam Sar, on rocky walls, 13,500 ft.
Distribution. — Alpine W. Himalaya, from Kashmir to Kumaon, 10,000-15,000 ft., Thian Shan Mts.

Pleurospermum angelicoides, Benth.

Stem up to 4 ft. high. Leaves 12-18 in. long, once or twice pinnate; pinnae 3-6 in. long, with oblong segments, segments of secondary pinnae often 1-3 in. long, regularly toothed. Bracts 5-8, 1-1¾ in. long, narrowly lance-shaped, entire, with a white margin. Bracteoles 5-8, ¾ in. long, narrow-lanceolate,

entire. Umbels compound: rays 10-20, 1-4 in. long. Fruit ½ in. long, narrowly oblong; ridges of carpels thin, narrowly winged, lateral rather the broadest; fruit-stalks ½-¾ in., often longer than the bracteoles.

Locality.—Alpine region, along streams.

Distribution.—Alpine W. Himalaya, from Kashmir to Nepal, up to 11,500 ft.

Pleurospermum stellatum, Benth.

Stems 1-6 in. high. Leaves 2-4 in. long, oblong, pinnate; pinnae egg-shaped, sharply toothed, or pinnatifid, or nearly twice pinnate. Bracts 1-4, ½-1½ in. long, pinnatifid. Bracteoles 5-8, oblong, white-margined, blunt, lobed or shortly pinnatifid at the tip. Umbels compound; rays 3-5, 1-6 in. long, hairless. Flower-stalks very short. Calyx-teeth obsolete. Style-bases globose, depressed. Fruit ⅙ in. long, somewhat longer than broad, ellipsoid; outer coat very loose, wrinkled; lateral ridges hardly as wide as the intermediate and dorsal, all blunt, hollow; furrows 1-vittate.

Locality.—Alpine regions, Karakoram, northern slope.

Distribution.—Alpine N. W. and W. Himalaya, from Kashmir to Kumaon, 13,000-16,000 ft.

Pleurospermum stylosum, C. B. Clarke.

Stems up to 4 ft. high. Leaves twice pinnate; pinnae 1-3 in. long; segments of secondary pinnae ½-1 in. long, pinnatifid or toothed. Bracts 4-6, 1-3 in. long, lobed or pinnatifid at the tip. Bracteoles 6-10, lance-shaped, entire, or deeply cut at the tip, white-margined. Umbels compound; rays 10-35, 1½-3 in. long. Calyx-teeth obsolete. Fruit ⅙ in. long, slightly longer than broad, almost globose, transversely wrinkled; outer coat very loose; ridges almost equal, hardly winged. Style-bases prominent even in the ripe fruit.

Locality.—Alpine regions.

Distribution.—Apparently endemic in Kashmir.

Pleurospermum densiflorum, Benth.

Stem 6-15 in. high. Leaves 3-4 in., egg-shaped, 3-4 times pinnate, ultimate segments very narrowly lanceolate or linear. Bracts 5-6, 1-2 in. long, oblong, tips usually pinnatifid or pinnate. Bracteoles 5-8, elliptic, entire or somewhat pinnatifid at the tip, white-margined, longer than the partial umbels. Umbels compound; rays 5-12, 1-2 in. long. Fruit ⅛-¼ in. long. ellipsoid, almost quadrate, with 5 almost equal somewhat

broad ridges; outer coat thin, loose; dorsal furrows 1-vittate, lateral 2-vittate, commissure 4-vittate. Seed about twice as broad as thick, grooved on the inner side.

Locality.—At altitudes of 11,000-14,000 ft.

Distribution.—N. W. Himalaya, from Kashmir to Garhwal.

Pleurospermum Brunonis, Benth.

This plant resembles *P. densiflorum* very much. The chief difference lies in the size and structure of the fruit.

Leaves 3-4 times pinnate; ultimate segments bristle-shaped. Bracteoles 5-8, elliptic or inversely egg-shaped, often pinnatifid at the tip. Fruit $\frac{1}{8}$-$\frac{1}{6}$ in. long, ellipsoid, almost quadrate; outer coat loose; furrows all 1-vittate, commissure 2-vittate. Seed 4-5 times as broad as thick, plane on the inner side.

Locality.—Temperate and alpine regions.

Distribution.—From Kashmir to Nepal.

ERYNGIUM, Linn.

I. Leaves divided *E. Billardieri.*
II. Leaves undivided *E. coeruleum.*

Fig. 3. Eryngium Billardieri, Delaroche.

Stem 6-18 in. high, erect or branching from the base, often bluish above. Basal leaves 2-4 in. diameter, long-stalked, 3-parted, often hastate, segments 3-fid or pinnatifid, spinous-toothed, stalk 2-4 in. long; stem-leaves stalkless, palmately 3-5-parted. Bracts 5-7, 1 in. long, linear, with few or no spines on the margin. Bracteoles linear, simple, slightly spiny, reaching beyond the flowers. Calyx-tube with lance-shaped scales, teeth lance-awl-shaped, spinescent. Fruit $\frac{1}{8}$ in. long.

Flowers.—May, June.

Locality.—Srinagar.

Distribution.—Kashmir, Sind, W. Asia.

*Eryngium coeruleum, Bieb.

Stem 2-3 ft. high, undivided below, often bluish above. Basal leaves 5 by $1\frac{3}{4}$ in., long-stalked, heart-shaped-oblong, undivided, crenate, not spiny, stalk 2-6 in. long; upper stem-leaves stalkless, palmately divided into lance-shaped slightly spinous segments. Bracts 5-6, 1 in. long, linear, with a few spines on the margin. Bracteoles linear, slightly spiny, simple, reaching beyond the flowers, a few sometimes spinous. Calyx-tube densely scaly; teeth lance-awl-shaped, spiny. Fruit $\frac{1}{8}$ in. long.

Flowers.—September.

Locality.—Below Gulmarg, dry open country, above 5,000 ft. common.

Distribution.—Temperate W. Himalaya, 5,000-6,000 ft., Afghanistan, Persia, Turkestan.

BUPLEURUM, Linn.

This genus can be recognised by the entire leaves.

A. Stem-leaves at least ½ in. broad, usually more.
 I. Stem-leaves almost linear to egg-lance-shaped, stem-clasping. Bracts 1-3.
 1. Bracteoles long-pointed ... *B. longicaule.*
 2. Bracteoles with a cusp at the tip { *B. longicaule* var. *Clarkeanum.*
 II. Stem-leaves egg-shaped or lance-shaped, lower ones stalked. Bract 0-1, linear *B. lanceolatum.*
 III. Stem-leaves oblong or egg-shaped-oblong, all stalkless. Bracts 2-4, broadly egg-shaped, leaf-like ... *B. Candollei.*
 IV. Stem-leaves (upper) round or egg-shaped-oblong, stem-clasping. Bract 1 or 0, egg-shaped ... *B. jucundum.*

B. Stem-leaves at most ⅛ in. broad, usually less.
 I. Leaves 4-10 in. long, margins thick *B. falcatum.*
 II. Leaves 1-3 in. long.
 1. Leaves not bristle-shaped ... *B. tenue.*
 2. Leaves bristle-shaped *B. subuniflorum.*

Fig. 4. Bupleurum longicaule, Wall.

Stems 8 in. to 3 ft. high, erect, sometimes branching from the root. Leaves very variable: basal leaves lance-shaped-linear or lance-shaped or inversely lance-shaped, blunt or long-pointed, about 5-11-nerved, up to 5 by ⅛-⅝ in.; stem-leaves stem-clasping, broadly heart-shaped, almost linear to egg-lance-shaped, above the middle more or less long-pointed, or from the base oval or oblong, blunt at the tip, 1½-4 in. by ⅛-⅜ in. Bracts 1-3, lance-shaped to egg-shaped, long-pointed or blunt. Bracteoles 10-12, often in 2 series, rarely only 5, up to ¼ in. by ⅛ in. Umbels up to 6 in. long; rays 3-7, more or less unequal, up to 2⅜ in. long, partial umbels about 50-flowered. Flower-stalks 2-3 times as long as the flowers.

Petals about $\frac{1}{25}$ in. broad, black. Fruit egg-shaped or elliptic-egg-shaped, up to $\frac{1}{5}$ in. long, ridges slightly winged, furrows 3-vittate, commissures 4-vittate.

Flowers.—June to August.

Locality.—Gangabal.

Distribution.—Subarctic Asia; W. Siberia, Altai Mts.; temperate E. Asia; N. China; Central Asia; Tibet, W. Himalaya from Kashmir to Sikkim, 8,000-13,000 ft.

Bupleurum longicaule var. Clarkeanum, Wolff. (=B. diversifolium, C. B. Clarke).

Stem about 3 ft. high, stout, sparingly and shortly branched above. Leaves distinctly stalked, middle and upper stem-leaves deeply heart-shaped, stem-clasping, broadly egg-shaped, towards the tip slowly long-pointed, $1\frac{3}{5}$-$2\frac{2}{5}$ in. long and up to $\frac{3}{5}$ in. broad. Bracteoles lance-shaped, with a cusp at the tip, as long as or longer than the partial umbels. Fruit about $\frac{1}{6}$ in. long, glaucous, oblong.

Locality.—Baltistan, 9,000-12,000 ft.

Distribution.—N. W. Himalaya, 7,000-9,000 ft.; W. Asia, S.E. Europe.

Bupleurum lanceolatum, Wall.

A perennial herb. Stems 1-5 ft. high. Leaves very variable; egg-shaped up to 3 by 2 in., egg-lance-shaped, up to 5 by $2\frac{1}{2}$ in., or narrowly lance-shaped up to 4 by 1 in., usually tapering to a fine point; lower leaves stalked, upper nearly stalkless. Bracts 0-1, linear, up to $\frac{1}{4}$ in. long. Bracteoles 2-6, narrowly lance-shaped, much shorter than their partial umbels, falling off after flowering. Umbel compound; rays 5-8, unequal; flower-stalks 6-12, $\frac{1}{8}$ in. long. Fruit $\frac{1}{6}$-$\frac{1}{5}$ in. long, yellowish-brown; ridges obscure in the ripe fruit; furrows 3-vittate.

Flowers.—August, September.

Locality.—Temperate regions, 4,000-10,000 ft.

Distribution.—W. Himalaya, from Kashmir to Nepal.

Bupleurum Candollei, Wall.

A perennial herb, up to 3 ft. high. Leaves stalkless, more or less stem-clasping, oblong up to 5 by 1 in., or egg-shaped-oblong up to 2 by $\frac{3}{4}$ in., usually finely pointed. Bracts 2-4, broadly egg-shaped, $\frac{1}{2}$-1 in. long, leaf-like, acute. Bracteoles 4-5, egg-shaped, about as long as the partial umbels. Umbel compound; rays 5-8. Fruit up to $\frac{1}{6}$ in. long, $\frac{1}{12}$ in.

broad, yellowish-brown; ridges distinct; furrows 1-3-vittate, commissures 2-4-vittate.

Flowers.—July-September.

Locality.—At altitudes of 8,000-12,000 ft.

Distribution.—Himalaya, from Kashmir to Sikkim, China.

Bupleurum jucundum, Kurz.

Stems 1-2 ft. high, erect, but decumbent at the base. Lower stem-leaves 1-1½ in. long, short-stalked, round, stalk scarcely ⅛ in. long; upper stem-leaves 1-2 in., round or egg-shaped-oblong, deeply heart-shaped, stem-clasping. Bract 1, ¼-¾ in. long, egg-shaped, leafy, often stem-clasping or heart-shaped, sometimes absent. Bracteoles 4-5, about ⅙ in. long, often absent. Umbel compound; rays 5-8, angular. Flower-stalks about half the length of the fruit. Fruit about ¼ in. long, elliptic-oblong, ridges prominent, furrows 3-4 vittate, commissures 4-vittate.

Locality.—At elevations of 7,000-12,000 ft.

Distribution.—Kashmir, Punjab.

Bupleurum falcatum, Linn.

Stems up to 4 ft. high, bluish-green. Leaves stalkless, linear, 4-10 by ¼-⅓ in. long, usually curved like a scythe, nerves 5-7, prominent, margins thick. Bracts 1-5, linear-lance-shaped, sharp-pointed, up to ¼ in. long. Bracteoles 4-5, lanceolate, shorter than their umbels. Umbels compound: rays about 3-15; flower-stalks 5-15, usually less than half the length of the fruit. Fruit very variable as to shape and size, ⅛-⅙ in. long, brown, ridges distinct, furrows 1-6-vittate, commissures 1-10-vittate.

Locality.—Baltistan.

Distribution.—This species has the widest distribution: S. and C. Europe, W. and C. Asia, Himalaya, from Kashmir to Bhutan, 3,000-12,000 ft., temperate E. Asia to Japan.

Bupleurum tenue, Buch. Collett, fig. 63.

Stems 1-3 ft. high, erect, much branched upwards. Lower leaves linear, upper linear-oblong, all blunt and narrowed to the base, 1-3 by ¼ in. Umbels numerous. Bracts 1-4, not prominent. Bracteoles 4-5, about as long as the fruiting partial umbels. Rays of umbel 3-8, slender flower-stalks very short. Fruit broadly oblong, reddish-brown when ripe, 1/10-⅛ in. long; ridges prominent, furrows 1-vittate.



FIGS.—1, *Caucalis latifolia*, Linn.; 2, *Pleurospermum sp.*; 3, *Eryngium Billardieri*, Delar.; 4, *Bupleurum longicaule*, Wall.; 5, *Aralia cachemirica*, Done.

Flowers.—July-September.
Locality.—Temperate regions.
Distribution.—Himalaya, from Kashmir to Sikkim, 1,000-9,000 ft., very common on the outer ranges of the W. Himalaya.

Bupleurum subunifiorum, Boiss. & Heldr.
(= B. setaceum, Fenzl.)

An annual herb. Stems slender, diffusely branched, up to 18 in. high, erect. Leaves bristle-shaped. Stem-leaves 1-1½ in. long, uppermost ¼ in. long. Umbels simple, few-flowered. Rays 1. Bracts 2, bristle-shaped, about $\frac{1}{24}$ in. long. Bracteoles 4-5. Flower-stalks 1-4, about $\frac{1}{24}$ in. long. Petals yellow. Fruit $\frac{1}{10}$ in. long, ellipsoid; ridges distinct, transversely rugose between the ridges; furrows 1-vittate, commissures 2-vittate.
Locality.—Kishtwar, 4,500 ft.
Distribution.—Central Mediterranean region and Central Asia.

ARALIACEAE.

ARALIA, Linn.

Fig. 5. Aralia cachemirica, Dcne. Collett, fig. 66.

An erect shrub, 5-10 ft. high, roughly hairy. Leaves large, 1-3 times pinnate; leaflets 5-9, stalked or stalkless, oblong-egg-shaped, 3-6 by 1½-3 in., toothed, sometimes lobed, abruptly pointed, lower surface pale, stiff-hairy above, hairless or hairy beneath. Umbels many in panicles about 1 ft. long. Bracts ½ in. long, few, lance-shaped, or sometimes 1½ in. long and leaf-like. Branches of panicle and flower-stalks hairy. Flowers white. Calyx 5-toothed. Petals 5, egg-shaped. Stamens 5. Styles free. Fruit black, globose, $\frac{1}{10}$ in. diameter, 5-ribbed.
Flowers.—August, September.
Locality.—Sonamarg.
Distribution.—Temperate Himalaya, from Kashmir, 9,000-12,000 ft., to Sikkim, 7,000-8,000 ft.

Plate 27

DIPSACEAE. The Scabious Family.

DIPSACUS, Linn. The Teasel.

Fig. 1. Dipsacus inermis, Wall. Unarmed Teasel.

A stout erect herb, more or less rough with stiff hair or bristles. Stems 4-10 ft. high. Leaves egg-shaped or lance-shaped, 3-12 in. long, coarsely toothed, long-pointed; lower leaves pinnatifid, end-lobe much the largest; upper leaves sometimes 3-parted; stalks dilated and united at the base. Flowers many, white, crowded in round heads 1 in. diameter, surrounded by 6-8, spreading, leaf-like bracts. Expanded top of the flower-stalk covered with broad concave scales narrowed into long, fringed, spine-like points reaching beyond the flowers when in bud. Calyx-limb cup-shaped, hairy, 4-angled, 4-lobed. Corolla-tube funnel-shaped, limb 4-lobed. Stamens 4, anthers protruding. Fruit 8-ribbed, crowned with the calyx-limb or finally naked.

This species is nearly related to the British Small Teasel (*Dipsacus pilosus*).

Flowers.—July, August.

Locality.—Sind Valley.

Distribution.—Temperate Himalaya, from Kashmir to Bhutan, 6,000-12,000 ft.

SCABIOSA, Linn. The Scabious.

I. Flowers bright or pale mauve *S. speciosa.*
II. Flowers purple *S. Candolliana.*

Fig. 2. Scabiosa speciosa, Royle. The large-flowered Himalayan Scabious. Coventry pl. XXIII.

A perennial herb growing in tufts. Stems 1-2 ft. high, often branched. Leaves 2 by $\frac{1}{3}$ in., opposite, oblong, often pinnatifid at the base, hairy on both surfaces. Flower-heads many-flowered. Bracts $\frac{1}{2}$-$\frac{2}{3}$ in. long. Flowers bright or pale mauve, hairy without, the outer flowers $\frac{3}{4}$ in. long, the inner ones exceeding the calyx-bristles. The base of each flower surrounded by a small ribbed cup. Calyx-limb of 5 long bristles. Corolla 5-fid. Perfect stamens 4. Ovary 1-celled. Fruit $\frac{1}{4}$ in. or more in length, silky below, the upper third 8-ribbed, with long deep pits between the ribs.

Flowers.—July, August.

Locality.—Gulmarg, grassy hill-sides, above 8,000 ft. common; Sonamarg; Aporwat.

Distribution.—Temperate Himalaya, from Kashmir to Garhwal, 7,000-11,000 ft.



FIGS.—1, *Dipsacus inermis*, Wall.; 2, *Scabiosa speciosa*, Royle; 3, *Morina Coulteriana*, Royle; 4, *Morina longifolia*, Wall.; 5, *Valeriana dioica*, Linn.

Scabiosa Candolliana, Wall. De Candolle's Scabious.

A perennial herb. Stems tufted, 12-18 in. high. Leaves 1½ by ⅛ in., very distant, linear, almost entire, lower nearly spoon-shaped. Flowers purple, hairy without, forming hemispheric heads ½ in. diameter, surrounded with short egg-shaped bracts, ⅛-⅛ in. long. The dilated top of the flower-stalk covered with short soft hairs. Limb of involucel funnel-shaped, 16-20-ribbed. Calyx-limb consisting of 5 long spreading rough bristles. Corolla 5-lobed. Stamens 4. Fruit very small, enclosed within the base of the spreading involucel and crowned by the persistent calyx-limb.

Flowers.—June, July.

Locality.—At elevations of up to 5,000 ft.

Distribution.—W. Himalaya, from Murree to Kumaon.

MORINA, Linn.

I. Flowers yellow *M. Coulteriana.*
II. Flowers white or pink.
1. Calyx-lobes entire. Corolla white or tinged with pink *M. persica.*
2. Calyx-lobes notched. Corolla deep pink *M. longifolia.*

Fig. 3. Morina Coulteriana, Royle.

A tall perennial herb, more or less hairy upwards. Stems 2-3 ft. high. Leaves 6 by ¾ in. long, stalkless, spinous-toothed, hairless. Flowers yellow, stalkless, crowded in the axils of the upper leaves forming an interrupted spike. Bracts free or almost so. Calyx-limb 2-lobed, lobes bifid with lobes sharp-pointed or spinous. Corolla-tube ½-¾ in. long. Fertile stamens 2, filaments half the length of the corolla-lobes. Seeds ¼ by ⅛ in., with a deep longitudinal furrow on one side.

Flowers.—June, July.

Locality.—Near top of Hayan Pass on grassy hillock, 10,000 ft.

Distribution.—Subalpine W. Himalaya, from Kashmir to Garhwal, 9,000-13,000 ft., Kashgar.

Morina persica, Linn.

A tall perennial herb, 3-4 ft. high, hairy upwards. Leaves up to 9 in., stalkless, doubly spinous-toothed, hairy or hairless. Flowers white or faintly tinged with pink, stalkless, crowded in the axils of the upper leaves forming an interrupted spike. Bracts free or nearly so. Calyx-lobes inversely egg-

shaped, entire or notched. Corolla-tube 1-1½ in. long. Fertile stamens 2, filaments usually the length of the corolla-lobes.

Flowers.—June.

Locality.—Temperate regions, 7,000-9,000 ft.

Distribution.—Temperate W. Himalaya, from Kashmir to Kumaon, W. Asia, S. Europe.

Fig. 4. Morina longifolia, Wall. Coventry pl. XXII. Collett, fig. 74.

A tall perennial herb, 2-4 ft. high. Stem stout, erect. Leaves 6 by 1 in., opposite or in whorls of 3, stalkless, long and narrow, very prickly, doubly spinous-toothed. Flowers 1-1½ in. long, white or tinged with pink, in distant whorls in the axils of the leaves forming an interrupted spike. Bracts leafy, spiny. Bases of the flowers enclosed in a small cup (involucel). Calyx-limb unequally 2-lipped, lips bifid with rounded lobes. Corolla-tube 1 in. long. Fertile stamens 2, filaments shorter than the corolla-lobes. Fruit free in the involucel.

Flowers.—August, September.

Locality.—Gulmarg, Sonamarg, in open sunny situations at 8,000-10,000 ft.; Gangabal.

Distribution. — Temperate and alpine Himalaya, from Kashmir to Bhutan, 9,000-14,000 ft.

VALERIANACEAE. The Valerian Family.

VALERIANA, Linn. The Valerian.

A. Stems not more than about 18 in. high.
 I. Basal leaves entire or almost so.
 1. Fruit hairless.
 a. Male and female flowers on different plants *V. dioica.*
 b. Male and female flowers not on different plants ... *V. pyrolaefolia.*
 2. Fruit hairy *V. elegans.*
 II. Basal leaves not entire.
 1. Bracteoles as long as the fruit... *V. Wallichii.*
 2. Bracteoles much shorter than the fruit *V. Stracheyi.*
B. Stems 1-5 ft. high.
 I. Leaflets 6-10 pairs *V. officinalis.*
 II. Leaflets 3-7 *V. Hardwickii.*

Fig. 5. **Valeriana dioica**, Linn. Marsh Valerian, Dioecious Valerian.

A perennial hairless herb with a slender stoloniferous rootstock. Stem 8-16 in. high, erect, simple, square in section. Basal leaves long-stalked, egg-shaped, entire, blunt; stem-leaves pinnatifid or with lobes divided nearly to the base, few, bluntly and coarsely toothed. Flowers white or rose-coloured. Stamens and pistils on different flowers. Both have an inconspicuous calyx, with a prominent rim round the top of the ovary in the female. Corolla with a small tube, having either rudimentary or no anthers, or it may be large or smaller, with no pistil, or a very rudimentary one. Stamens 3. Fruit small, ribbed, and hairless. Upper bracts usually longer than the fruit.

Flowers.—July.

Locality.—Tosh Maidan, Karakoram, 11,000-13,000 ft., frequent.

Distribution.—Temperate W. Himalaya, Kashmir and Lahul, N. W. Asia, Europe.

Valeriana pyrolaefolia, Dcne.

This species is nearly related to *V. Wallichii*, and may be only a form of that species. It differs in its broadly egg-shaped or round, blunt, basal leaves and stalkless stem-leaves.

Flowers.—July.

Locality.—Khur Mt., 13,300 ft.

Distribution. — Temperate Himalaya, from Kashmir to Kumaon, 9,000-14,000 ft.

Valeriana elegans, C. B. Clarke. Elegant Valerian.

Rootstock thick, woody, branching. Stem 6-9 in. high, erect, often branched from near the base, slightly hairy, hairless upwards. Leaves all entire, spoon-shaped, egg-shaped or oblong, blunt. Basal leaves several at fruit-time, egg-shaped; stem-leaves several, similar, oblong. Flowers in loose panicles, bright pink. Upper bracts oblong, small, scarcely half as long as the fruit. Fruit hairy.

Locality.—Skardo in Baltistan, 9,000 ft.

Distribution.—Apparently endemic.

Valeriana Wallichii, DC. Wallich's Valerian.

A slightly hairy perennial herb. Rootstock thick, horizontal. Stem 6-18 in. high, usually tufted. Basal leaves often 1-3 in. diameter, long-stalked, deeply heart-shaped-egg-shaped, usually toothed or sinuate, sharp-pointed. Stem-leaves few, much smaller, entire or pinnate. Flowers white or tinged with pink, in a terminal corymb 1-3 in. wide, often unisexual, the male

and female on different plants. Bracteoles oblong-linear, as long as the fruit. Fruit hairy or nearly hairless.

Flowers.—May.

Locality.—Tanmarg, forest, 7,200-8,700 ft.; Gadsar.

Distribution. — Afghanistan, temperate Himalaya, from Kashmir to Bhutan, 10,000 ft., Khasia Hills, 4,000-6,000 ft.

Valeriana Stracheyi, C. B. Clarke. Strachey's Valerian.

A slender, hairy plant. Rootstock woody, very stout. Stems 6-12 in., erect, often branching from near the base. Basal leaves at flower-time absent, lyrate-pinnate, end-lobe rhomboid; stem-leaves several, minutely hairy, end-lobe toothed or nearly entire. Flowers in a slender corymb, ultimate branchlets 1-2 in. Bracteoles very small, lance-shaped, much shorter than the fruit. Fruit covered with shaggy hairs.

Locality.—Temperate regions.

Distribution. — Temperate Himalaya, from Kashmir to Kumaon, 4,000-8,000 ft.

Valeriana officinalis, Linn. Cat's Valerian, Officinal Valerian.

Rootstock short, almost erect, thicker than the stem, producing suckers. Stem 1-3 ft., erect, solitary, furrowed, smooth, hairy below, fœtid. Basal leaves long-stalked. Leaves alternate, with lobes each side of a common stalk, the leaflets in 6-10 pairs, narrowly oblong or linear, often entire, much or sparingly toothed. Flowers white or flesh-coloured. Upper bracts $\frac{1}{10}$ in. long, oblong-linear, shorter than the fruit. Petals united to one another so as to form a tube ending above in 5 lobes. Fruit hairless.

Flowers.—May.

Locality.—Gadsar; Sonamarg, 8,000-9,000 ft.

Distribution.—Kashmir, N. and W. Asia, Europe.

Valeriana Hardwickii, Wall. Hardwick's Valerian.

A pubescent herb. Rootstock descending. Stem 1-5 ft., erect, usually simple or branched upwards. Basal leaves few, soon disappearing, long-stalked, egg-shaped, 2-4 by $1\frac{1}{2}$-3 in. Stem-leaves pinnate, 3-6 in., lower ones stalked, crowded, upper stalkless, leaflets 3-7, lance-shaped, usually entire, long-pointed, end-one largest. Flowers white, in numerous, axillary, stalked, compound corymbs forming a long panicle, often 1-sexual.

Flowers.—July, August.

Locality.—Temperate regions.

Distribution. — Temperate Himalaya, from Kashmir to Bhutan, 4,000-12,000 ft., Khasia Hills, 4,000-6,000 ft., Java.

Plate 28

COMPOSITAE. The Composite Family.

ASTER, Linn. Aster.

A. Ray-flowers blue or lilac.
 I. Ray-flowers white at base, elsewhere bluish, inner flowers orange-yellow — *A. Falconeri.*
 II. Ray-flowers blue or lilac.
 1. Achenes $\frac{1}{8}$ in. long. Ray-flowers 20-30.
 a. Flowers blue — *A. altaicus.*
 b. Flowers lilac — *A. molliusculus.*
 2. Achenes $\frac{1}{12}$ in. long. Ray-flowers very many — *A. tibeticus.*
 3. Achenes $\frac{1}{2}$ in. long. Ray-flowers 50-60 — *A. heterochaeta.*
B. Ray-flowers purple — *A. Thomsoni.*

Fig. 1. **Aster Falconeri**, Hutch. Falconer's Aster.

A perennial herb. Stem about $1\frac{1}{2}$ ft. high, densely leafy at the top and supporting a single flower-head. Leaves at the base numerous, oblong-lance-shaped or inversely-lance-shaped, almost sharp-pointed or with a small mucro, gradually narrowed at the base, rather distantly toothed, the teeth about $\frac{1}{2}$ in. apart, thinly papery, 6-8 in. long, $1\frac{3}{4}$-2 in. wide, with about 6 lateral veins on each side, somewhat sunk above, slightly raised beneath. Stem-leaves lance-shaped, gradually narrowed to an acute tip, rounded or somewhat stem-clasping at the base, the larger 3 in. long, $1\frac{1}{4}$ in. wide, the smaller $1\frac{3}{4}$ in. long, under $\frac{1}{2}$ in. wide, entire, sparingly hairy above and below with about 5 lateral veins on each side ascending from the stout midrib. Flower-head $3\frac{1}{2}$ in. across, surrounded by 4 leafy outer bracts. Bracts of the involucre (immediately below the flowers) in 3 series, the outer green, linear-lance-shaped, acute, under $\frac{1}{2}$ in. long, the inner slightly hairy, with filiform tips. Outer flowers many; tube over 1 line long, green, hairy; blade linear, trifid at the tip, $1\frac{1}{2}$ in. long, $1\frac{1}{2}$ line wide, white at the base, elsewhere bluish; style exserted; fruit (achene) nearly cylindric, sparingly hairy; pappus in 2 series, outer thin, linear-lance-shaped, sharp-pointed, finely serrulate, long, inner filiform, finely barbed. Inner flowers orange-yellow, tube $2\frac{1}{2}$ lines long, swollen and hairy in the middle, elsewhere hairless, whitish green towards the base; anthers $1\frac{1}{2}$ line long, pappus as in the outer flowers; achenes nearly quadrangular, sparingly hairy; style exserted, lobes $\frac{1}{2}$ line long.

Flowers.—July to August.

Locality.—Open hill-sides above Gulmarg, above 9,000 ft., common.

Distribution.—Mountains surrounding the valley of Kashmir.

Aster altaicus, Willd. Altai Aster.

A rigid herb. Stem 2-3 ft. high, slender, green, much grooved and branched, leafy. Leaves ½-2 in., stalkless, linear or oblong, blunt, entire, sometimes contracted at the base, nerves very indistinct. Heads solitary, ⅛-⅔ in. diameter, stalked or stalkless. Bracts surrounding the flower-head ¼ in. long, linear-lance-shaped, long-pointed. Ligules of outer flowers 20-30, blue, short, bent back when dry, sometimes absent. Fruit (achene) ⅛ in. long, pappus rather longer.

Locality.—At elevations of 9,000-13,000 ft.

Distribution.—Afghanistan, Baluchistan, W. Himalaya from Kashmir to Kumaon, Central Asia, Altai Mts., China.

Aster molliusculus, Wall. Collett, fig. 76.

A more or less hairy perennial herb. Stems erect or ascending from a woody rootstock, up to 2 ft. high, leafy, slender, rigid, often tinged with red. Leaves ½-1 in. long, almost stalkless, lance-shaped, entire or obscurely toothed. Heads usually 1, rarely 2-3, long-stalked, ½-¾ in. diameter. Bracts surrounding the flower-head linear-lance-shaped. Outer flowers of the head lilac, ligules 20-30, often bent back. Outer hairs of the pappus much shorter than the inner, white, inner hairs reddish. Fruit (achene) ⅛ in. long, hairy.

Flowers.—June to September.

Locality.—Temperate regions.

Distribution.—W. Himalaya, from Kashmir to Kumaon, Tibet, 15,000 ft. (north of Kumaon and Sikkim).

Aster tibeticus, Hook. f. Tibetan Aster.

A more or less hairy perennial plant. Stem 4-12 in. high, slender, erect, sparingly leafy. Leaves small; basal leaves 1-2 in. long (including the stalk), lance-shaped or inversely lance-shaped, blunt or sharp-pointed, entire; stem-leaves stalkless, linear-oblong, blunt. Heads solitary, rarely 2-3, 1-2 in. diameter. Outer bracts surrounding the head, linear, sharp-pointed, hairy. Ligules of outer flowers very many, bright blue, ½-¾ in. long. Fruit (achene) flat, 1/12 in. long; pappus double, white, ⅛ in. long, outer hairs few, slender.

Flowers.—June.

Locality.—Damam Sar; Karakoram, 14,000-15,000 ft.

Distribution.—W. Himalaya and Tibet (north of Kumaon).



FIGS.—1, *Aster Falconeri*, Hutch.; 2, *Erigeron multiradiatus*, Benth.; 3, *Erigeron alpinus*, Linn., forma *khasiana*; 4, *Erigeron sp.*; 5, *Erigeron patentisquama*, J. F. Jeffrey; 6, *Erigeron sp.*

Aster heterochaeta, Benth.

A very hairy herb. Stem absent or, when present, erect and leafy. Basal leaves inversely egg-shaped or inversely lance-shaped, sharp-pointed, entire; stem-leaves 1-2, oblong, half-stem-clasping. Heads solitary, very large. Bracts surrounding the heads in few series, herbaceous, outer ones linear-lance-shaped, long-pointed. Ligules of outer flowers (ray-flowers) 50-60. Fruit (achene) ½ in. long; pappus double, white or reddish, outer very short.

Hallberg says in a note that the ligules are blue.

Distribution. — Alpine Himalaya and W. Tibet, 14,000-18,000 ft., Altai Mountains.

Aster Thomsoni, Clarke. Thomson's Aster.

A hairy herb. Stem 1-3 ft. high, erect, branched, bending at the joints. Branches slender. Leaves 2-4 by 1-2½ in., nearly stalkless, broadly egg-shaped, long-pointed, coarsely and sharply toothed. Heads solitary, 1½-2½ in. diameter, long-stalked. Bracts surrounding the heads herbaceous, linear-lance-shaped, long-pointed. Ligules of outer flowers purple, 20-30, ½-¾ in. long, spreading. Fruit (achene) ⅛-⅙ in. long, hairy, much longer than the pappus. Pappus single, much shorter than the corolla, reddish.

Flowers.—July, August.

Locality.—At elevations of 7,000-10,000 ft.

Distribution.—Temperate W. Himalaya, from Kashmir to Nepal.

ERIGERON, Linn. The Fleabane.

A. Heads 2-3 in. diameter *E. multiradiatus.*

B. Heads between ½ and ¾ in. diameter.

I. Pappus red... *E. alpinus.*

II. Pappus whitish. Achene ½-⅝ in. long *E. patentisquama.*

III. Pappus white, then reddish. Achene ⅛ in. long *E. andryaloides.*

C. Heads ⅓ in. diameter *E. bellidioides.*

D. Heads ⅛-¼ in. diameter *E. canadensis.*

Fig. 2. Erigeron multiradiatus, Benth.

A hairy herb. Stems 8-24 ft. high, erect, stout or slender, simple or branched sparingly above. Leaves stalkless, egg-lance-shaped, 1½ by ¾ in., entire or coarsely toothed, sharp-pointed or blunt. Heads 2-3 in. diameter, solitary or a few, long-stalked. Bracts surrounding the heads narrow, sharp-

pointed. Ligules of the outer flowers very numerous, dark purple, spreading, 2-3 times longer than the red pappus. Fruit (achene) $\frac{1}{12}$ in. long, nearly hairless.

Flowers.—August.

Locality.—Khelanmarg, grassy hill-sides, about 10,000 ft., common.

Distribution. — Temperate and alpine Himalaya, from Kashmir to Sikkim, 9,000-12,000 ft.

Fig. 3. Erigeron alpinus, Linn. forma **khasiana** (var. **khasiana**, C. B. Clarke). Alpine Fleabane.

An erect hairy perennial herb. Stem up to 1 ft. high, usually unbranched below. Basal leaves very crowded, inversely egg-lance-shaped, stalked ; stem-leaves few, stalkless. Heads few, stalked. Bracts hairy. Ligules of outer flowers numerous, twice as long as the red rather copious pappus. Inner flowers tubular, numerous, slender. Fruit (achene) slightly silky.

Flowers.—August.

Locality.—Above Gulmarg, margs and open hill-sides, above 9,000 ft., common.

Distribution.—This form has been found so far only in Kashmir and Bhutan and the Khasia Hills, 3,000-6,000 ft.

Fig. 4. Erigeron sp.

May be a variety of the very variable *Erigeron acer*, Linn. The whole genus requires a careful revision.

Flowers.—September.

Locality.—Gulmarg, wooded hill-sides, shady places above 8,000 ft., common (Mrs. Wathen).

Fig. 5. Erigeron patentisquama, J. F. Jeffrey.

A perennial herb, densely hairy all over ; root rather stout, fibrous. Stems several, stout, rather leafy. Basal leaves numerous, forming a rosette, spoon-shaped, $1\frac{3}{4}$-2 in. long, $\frac{2}{5}$-$\frac{4}{5}$ in. broad, gradually narrowing into a stalk $\frac{4}{5}$-$1\frac{1}{5}$ in. long, margin entire, shining green on the upper surface ; stem-leaves narrowly lance-shaped, pointed or long-pointed, broad at the base, $\frac{4}{5}$-$1\frac{2}{5}$ in. long. Heads solitary, about $\frac{1}{2}$ in. diameter. Ray-flowers pale rose, scarcely longer than the bracts. Inner flowers dirty yellowish-purple. Bracts very densely hairy, the outer ones spreading and bent back, $\frac{2}{5}$-$\frac{3}{5}$ in. long. Achenes inversely egg-shaped, compressed, $\frac{1}{12}$-$\frac{1}{8}$ in. long, $\frac{1}{24}$ in. broad, slightly hairy. Pappus whitish, $\frac{2}{5}$-$\frac{3}{5}$ in. long.

Flowers.—June.
Locality.—Khelanmarg, open hill-sides, above 10,000 ft., common; Tilail, 12,000 ft.; Baltistan, 11,000-12,000 ft.
Distribution.—Kashmir, Tibet, Yunan, 14,000 ft.

Fig. 6. **Erigeron sp.**

Flowers.—July.
Locality.—Damam Sar.

Erigeron andryaloides, Benth.

A perennial herb with a woody, very stout rootstock, densely hairy. Leaves 1-2 in. long, densely crowded, stalked, spoon-shaped, entire or slightly lobed. Heads $\frac{2}{3}$ in. diameter, on a very naked stem which bears 1 or 2 small linear leaves or none at all. Bracts linear, sharp-pointed, hairy. Ligules short, broad, bent back. Achenes $\frac{1}{6}$ in., flat, narrow, silky. Pappus white, then reddish, rather longer, in one series.
Locality.—Baltistan.
Distribution.—Temperate and alpine Himalaya and Tibet, 9,000-18,000 ft.

Erigeron bellidioides, Benth.

A perennial herb, hairless or nearly so. Stem slender, grooved, sparingly branched. Basal leaves lance-shaped, sharply toothed. Stem-leaves stalkless, oblong or linear-oblong, entire or crenate. Heads $\frac{1}{3}$ in. diameter, few, long-stalked. Ligules 3 times as long as the red pappus, shorter hairs few. Fruit (achene) slightly silky.
Locality.—Ladakh.
Distribution.—Temperate W. and Central Himalaya, from Kashmir to Nepal, 5,000-10,000 ft.

Erigeron canadensis, Linn. Canadian Fleabane.

An annual herb. Stem up to 3 ft. high, very slender, much branched above, hairy. Branches erect. Leaves oblong, linear to lance-shaped, fringed with hairs, entire or with a few teeth. Flower-heads numerous, small, yellow, stalked, forming long-branched panicles. Bracts surrounding the heads slender, green, with membranous border, smooth. Ligules of outer flowers erect, pink or purplish, hardly longer than the pappus, which is white.
Locality.—Lower regions, up to 3,000 ft.
Distribution.—Punjab, W. Himalaya, Rohilkhand, Lower Sind, all warm countries. Supposed to be indigenous in N. America.

Plate 29

SOLIDAGO, Linn.

Fig. 1. Solidago Virga-aurea, Linn. The Golden Rod, Aaron's Rod, Banwort.

A tall, graceful, perennial herb, with few branches, with angular edges, rather rough. Stems erect, stout, 6-24 in. Leaves lance-shaped, basal ones short-stalked, elliptic, coarsely toothed, sharp-pointed or blunt, upper leaves smaller, narrower, entire. Heads 1-4 on short axillary stalks, gathered in a long leafy panicle. Bracts at base of flower-head narrow, sharp-pointed, in several rows. Ray-flowers (outer flowers) 10-12, central flowers 10-20, all golden yellow. Fruit (achene) hairless or slightly hairy, ribbed.

Flowers.—June to September.

Locality.—Gulmarg, grassy and wooded hill-sides, above 8,000 ft., common; Tosh Maidan, along top of ridge.

Distribution.—Temperate Himalaya, 5,000-9,000 ft., Khasia Hills, 4,000-6,000 ft., China, Europe, temperate Asia and America.

ANAPHALIS, DC.

A. Stem not more than 1 ft. high.
 I. Leaves ¼-½ in. *A. nubigena.*
 II. Leaves 1-2 in. *A. cuneifolia.*
B. Stems more than 1 ft. high.
 I. Bracts surrounding the flower-heads acute, spreading in flower *A. triplinervis.*
 II. Bracts blunt, erect in flower.
 1. Leaves with 2 basal lobes (auricles).
 a. Leaves 2-5 in. long, lower surface cinnamon-red or grey, basal lobes short *A. cinnamomea.*
 b. Leaves 1½-2 in., basal lobes long, decurrent *A. araneosa.*
 c. Leaves ½-1 in., basal lobes short *A. contorta.*
 2. Leaves without 2 basal lobes (auricles) *A. virgata.*

Fig. 2. Anaphalis nubigena, DC.

A dwarf, softly woolly or cottony herb. Stems simple, tufted, 3-8 in. high. Leaves ¼-½ in., narrow, scattered, sharp-pointed or with a naked awn, base contracted. Heads 1 or few, ½-1 in. diameter. Bracts surrounding the heads lance-shaped, blunt or almost sharp-pointed, ¼-⅓ in. and longer.

Flowers.—June to August.

Locality.—Gangabal.

Distribution.—Alpine Himalaya, 12,000-16,000 ft.

Anaphalis cuneifolia, Hook. f.

A softly woolly or cottony herb. Stems several, slender, ascending, 6-12 in. high, often with runners. Leaves 1-2 in. long, linear-oblong or inversely egg-shaped-oblong, or the lower spoon-shaped, half-stem-clasping. Heads ½-¾ in. diameter. Bracts surrounding the heads ⅛ in. long, lance-shaped, sharp-pointed or blunt, white.

Locality.—At elevations of 8,000-12,000 ft.

Distribution. — Temperate and alpine Himalaya, from Kashmir to Sikkim (9,000-13,000 ft.)

Anaphalis triplinervis, C. B. Clarke.

Stems stout, 1-2 ft. high, usually unbranched, often flexuose. Leaves 3-8 by 1-3 in., broadly egg-shaped or inversely egg-shaped or elliptic-oblong, sharp-pointed, stem-clasping, 3-5-nerved, cobwebby above, densely clothed with white wool beneath, tipped with a small, black, naked, point. Heads ½-¾ in. diameter, numerous, forming corymbs. Bracts surrounding the heads ⅛ in. long, egg-lance-shaped, white, spreading in flower.

Flowers.—July, August.

Locality.—At elevations of 6,000-10,000 ft.

Distribution. — Temperate Himalaya, from Kashmir to Bhutan.

Anaphalis cinnamomea, C. B. Clarke.

Stems 1-2 ft. usually simple, stout, leafy. Leaves 2-5 by ½-¾ in., 3-5-nerved, spreading or horizontal, narrowly lance-shaped, usually shortly lobed at the base, sharp-pointed or blunt, hairless or woolly above, densely clothed beneath with white-grey or cinnamon-red wool. Heads many, almost spherical, ¼-⅓ in. diameter in compound corymbs. Bracts surrounding the heads ⅛ in. long, elliptic-egg-shaped, blunt, erect or bent inwards, white, spreading in fruit.

Locality.—At elevations of 4,000-9,000 ft.

Distribution.—Temperate Himalaya, from Kashmir to Sikkim and Bhutan, 5,000-8,000 ft., Khasia Hills, 4,000-6,000 ft., Upper Burma, N. China, Japan, Ceylon.

Anaphalis araneosa, DC.

Stem 1-3 ft. high, erect, usually much-branched, winged by the decurrent leaf-bases, hairy, leafy. Basal leaves inversely lance-shaped. Stem-leaves linear, 1½-2 by ⅛-¼ in., sharply pointed, margins often bent back, basal lobes usually long, sharp-pointed and decurrent. Heads ⅛ in. diameter, very many, forming a corymb 3-6 in. across. Bracts surrounding the heads about $\frac{1}{10}$ in. long, elliptic, blunt, white.

Flowers.—August.

Locality.—At elevations of 4,000-7,000 ft.

Distribution. — Temperate Himalaya, from Kashmir to Sikkim, 6,000-10,000 ft., Khasia Hills, 4,000-7,000 ft.

Anaphalis contorta, Hook. f.

Stems up to 2 ft. high, usually branched from the base. Branches often decumbent, leafy. Leaves ½-1 by ⅛ in., usually crowded, stalkless, half-stem-clasping, linear, sharp-pointed or blunt, spreading and twisted, shortly lobed at the base, 1-nerved, margins sometimes bent back. Heads ⅙ in. diameter, almost spherical, in dense clusters. Bracts surrounding the flower-heads $\frac{1}{10}$ in. long, broadly egg-shaped, blunt, white or yellowish, outer ones often purplish, erect in flower, spreading in fruit.

Locality.—Temperate regions, common.

Distribution.—Temperate and subalpine Himalaya, from Kashmir to Sikkim, 7,000-13,000 ft., Mishmi Hills, Khasia Hills, 4,000-7,000 ft.

Anaphalis virgata, Thoms.

A woolly perennial herb. Stems many, 8-16 in. high, slender, erect, rigid, from a woody stock, simple or branched above. Leaves 1-1½ by $\frac{1}{12}$-⅓ in., spreading, narrowly linear from a broad or narrow base, or elliptic-lance-shaped, margins flat or bent back. Heads ⅛-⅙ in. diameter, bell-shaped, very many, stalked, forming open branched corymbs. Bracts surrounding the heads ⅙ in. long, linear-oblong, obtuse, lower half rigid, upper white or yellowish.

Locality.—Temperate and subalpine region.

Distribution.—W. Himalaya, 8,000-13,000 ft.

INULA, Linn.

A. Herbs.
- I. Having basal and stem-leaves.
 - 1. Leaves more than 5 in. long.
 - *a.* Basal leaves 6-10 in. (Fig. 3) *I. Royleana.*
 - *b.* Basal leaves 8-18 in. (Fig. 5) *I. racemosa.*
 - 2. Leaves not more than 4 in. long.
 - *a.* Leaves glandular-toothed (Fig. 4) *I. grandiflora.*
 - *b.* Leaves not glandular-toothed.
 - i. Leaves halbert-shaped ... *I. acuminata.*
 - ii. Leaves with 2 stem-clasping basal lobes ... *I. Falconeri.*
- II. Having only basal leaves forming a rosette *I. rhizocephaloides.*

B. Shrubs.
- I. Branches densely hairy *I. Cappa.*
- II. Branches hairless, or young branches slightly hairy *I. cuspidata.*

Fig. 3. **Inula Royleana**, DC. Royle's Inula.

A stout herb, more or less hairy and glandular. Stem 1-2 ft. high, grooved. Leaves rather membranous, blunt, almost hairless or very hairy above, sometimes thickly woolly beneath, finely toothed; basal leaves 6-10 by 4-6 in., egg-shaped or oblong with a winged petiole; stem-leaves variable, lyrate, with 2 lobes at the base. Heads 3-4 in. diameter, solitary on a stout, erect, hairy stalk, hemispheric. Bracts surrounding the flower-head slender, long-pointed. Fruit (achene) $\frac{1}{6}$ in long, hairless, slender. Pappus pale red.

Flowers.—July to September.

Locality.—Aporwat above Gulmarg, open hill-side and margs, amongst boulders and short grass, above 9,000 ft., common; Baltal.

Distribution.—Temperate W. Himalaya, 7,000-11,000 ft.

Fig. 4. **Inula grandiflora**, Willd. Large-flowered Inula.

A perennial bristly, hairy herb. Stems leafy throughout, 12-18 in. high, simple or branched. Leaves stalkless, dilated at the base, oblong or elliptic-lance-shaped, long-pointed, 2-3 by $\frac{3}{4}$ in., glandular-toothed, fringed with long hairs. Heads 2-2$\frac{1}{2}$ in. diameter, solitary. Bracts (not shaggy) hairy, rather rigid, outer ones long, leaf-like, inner shorter, narrow. Ligules narrow, $\frac{3}{4}$-1 in. long, 3-toothed. Fruit (achene) with few short hairs or hairless. Pappus $\frac{1}{6}$ in. long, dirty-white.

Flowers.—August.

Locality.—Ferozepore Nala, amongst boulders in water-course, about 8,000 ft., very rare; Sind Valley.

Distribution.—W. Asia, temperate W. Himalaya, from Kashmir (6,000-7,000 ft.) to Nepal (8,000-12,000 ft.).

Inula acuminata, DC.

An annual, usually hairless herb. Stem strict, hairless or slightly hairy above, shining, 10-14 in. high, sometimes branched. Leaves 1-4 in. long, almost erect, halbert-shaped, stalkless, heart-shaped, gradually tapering from the broad base to the very long-pointed tip, hairless, base obscurely toothed. Heads $\frac{1}{2}$-$\frac{3}{4}$ in. diameter, few. Bracts narrow-linear, long-pointed, erect, green, slightly hairy. Ligules short, bent back. Fruit (achene) $\frac{1}{24}$ in. long, with a few short erect hairs. Pappus $\frac{1}{6}$ in. long, pale red.

Locality.—Baramula.

Distribution.—Temperate W. Himalaya, up to 8,000 ft.

Inula Falconeri, Hook. f. Falconer's Inula.

A very variable, hairless or hairy, annual herb. Stem usually branched, rarely simple, slender or stout, 12-18 in. high. Lower leaves linear or oblong or linear-oblong, $\frac{1}{2}$-3

by ¼ in. gradually contracted above the stem-clasping basal lobes. Stem-leaves oblong. Heads ½-⅔ in. diameter, forming corymbs. Bracts linear, sharp-pointed, more or less hairy, green, erect or bent back. Fruit (achene) $\frac{1}{12}$ in. long, nearly hairless. Pappus ⅛ in. long, pale red.

Locality.—Baltistan, 7,000-8,000 ft.

Distribution.—Temperate W. Himalaya.

Fig. 5. Inula racemosa, Hook. f.

A tall, stout herb. Stem 1-5 ft. high, rough, grooved. Leaves leathery, rough above, densely hairy beneath, crenate. Basal leaves 8-18 by 5-8 in., long-stalked, elliptic-lance-shaped. Stem-leaves oblong, half-stem-clasping, often deeply lobed at the base. Heads many, very large, 1½-2 in. diameter, in racemes. Outer bracts broad, tips triangular, bent back, inner bracts linear, sharp-pointed. Ligules slender, ½ in. long. Fruit (achene) ⅙ in. long, slender, hairless. Pappus ⅓ in. long, reddish.

Flowers.—June, July.

Locality.—Basam Gali, open spots in Juniper tract above 10,000 ft.; Tosh Maidan, 11,000-12,000 ft., abundant, in certain places covering the ground with its large leaves; Damam Sar, 13,500 ft.; Mekhowali, in forest clearings; Sind Valley.

Distribution.—Temperate and alpine W. Himalaya, 5,000-14,000 ft.

Inula rhizocephaloides, C. B. Clarke.

A small herb, 2-5 in. diameter. Leaves all at the base of the stem, forming a rosette, pressed to the ground, inversely egg-spoon-shaped, blunt, ciliate, narrowed into a broad stalk. Heads ⅔-1 in. diameter, stalkless, crowded. Bracts all alike, linear, sharp-pointed, erect or tips bent back. Ray-flowers (outer of the head) few with very small ligules, or tubular, or absent. Fruit (achene) $\frac{1}{15}$ in. long, hairless, ribbed. Pappus ⅓ in. long, red.

Locality.—Dras, 7,000-9,000 ft.; Ladakh, 12,000-14,000 ft.; Baltistan.

Distribution.—Temperate and alpine W. Himalaya.

Inula Cappa, DC.

An aromatic shrub, 4-8 ft. high. Branches very stout, densely hairy. Leaves stalkless or short-stalked, 3-6 by 1-2½ in., leathery, oblong or oblong-lance-shaped, sharp-pointed, toothed, more or less hairy above, densely hairy below. Heads very numerous, ⅛ in. diameter, in many crowded rounded corymbs. Bracts surrounding the heads vary variable, always narrow, linear or awl-shaped, rigid, inner ones as long as the



FIGS.—1, *Solidago virga-aurea*, Linn.; 2, *Anaphalis nubigena*, DC.; 3, *Inula Royleana*, DC.; 4, *Inula grandiflora*, Willd.; 5, *Inula racemosa*, Hook. f.

flowers, outer gradually shorter. Ligules of outer flowers few, very short, or none. Fruit (achene) $\frac{1}{20}$ in. long, silky. Pappus $\frac{1}{6}$ in. long, dirty-white, tips thickened.

Flowers.—August.

Locality.—Along the Murree Road.

Distribution.—Temperate Himalaya, from Kumaon (10,000 ft.) to Bhutan (4,000-6,000 ft.), Khasia Hills (4,000-5,000 ft.), Pegu, Burma, China, Java.

Inula cuspidata, C. B. Clarke. Collett, fig. 78.

A nearly hairless shrub. Stems 4-8 ft. high. Branches slender. Leaves 3-5 by 2 in., stalked, elliptic-lance-shaped, long-pointed, upper surface rough, lower slightly hairy, teeth many, sharp, small. Heads numerous, $\frac{1}{3}$ in. diameter, on slender stalks, crowded in broad corymbs. Bracts surrounding the heads linear, rigid, sharp-pointed, inner ones as long as the flowers, outer shorter. Ligules short, broad, 2-3-toothed. Fruit (achene) $\frac{1}{16}$ in. long, silky. Pappus $\frac{1}{6}$ in. long, yellowish, tips thickened.

Flowers.—August.

Locality.—Temperate regions.

Distribution.—W. Himalaya, from Kashmir to Kumaon, 4,000-7,000 ft.

Plate 30

BIDENS, Linn.

A. Fruit (achene) wedge-shaped, tip truncate.
 I. Leaves undivided... *B. cernua.*
 II. Leaves 3-lobed, 3-parted or pinnatifid ... *B. tripartita.*
B. Fruit (achene) long and slender, narrowed towards the top *B. pilosa.*

Fig. 1. Bidens cernua, Linn. Bur Marigold.

A stout, erect, hairless annual, 1-2 ft. high, round in section, branched above, leafy, with opposite branches. Leaves 3-5 in. long, in pairs, united below, stalkless, entire, oblong to lance-shaped, coarsely toothed. Flower-heads $\frac{3}{4}$-1 in. diameter, drooping, solitary. Bracts surrounding the flower-heads spreading or turned back, leafy, the inner not so long, broadly oblong, blunt, with black streaks. Ligules absent (in Indian plants). Fruit wedge-shaped, compressed, with 1-4 short bristles, narrow or inversely egg-shaped. Pappus-hairs barbed.

Flowers.—June.

Locality.—Srinagar.

Distribution.—W. Himalaya, from Kashmir to Chamba, 5,000-6,000 ft., N. Asia, Central and N. Europe, N. America.

Bidens tripartita, Linn. Three-lobed Butterbur, Water Agrimony.

A stout, erect, hairless perennial. Stem 1-3 ft. high. Branches opposite, rather spreading. Leaves 3-5 in. long, stalked, 3-lobed, 3-parted or pinnatifid. Segments lance-shaped, toothed. Flower-heads yellow, erect, solitary, $\frac{3}{8}$ in. diameter, stalks long or short. Bracts herbaceous, inner ones oblong, outer ones longer. Fruit (achene) $\frac{1}{4}$ in. long, hairless, with 2-3 short awns.

Flowers.—July, August.

Locality.—Temperate regions, in moist places; Baltistan.

Distribution.—Temperate Himalaya, from Kashmir to Nepal, 3,000-5,000 ft., N. Asia, Japan, N. Africa, W. Europe, N. America.

Bidens pilosa, Linn.

An erect hairless or more or less hairy annual. Stem 2-3 ft. high, quadrangular, grooved. Branches opposite. Leaves very variable, 3-fid, of 3 leaflets or once or twice pinnate. Flower-heads $\frac{1}{2}$ in. diameter, getting longer in fruit. Outer bracts herbaceous, oblong, shorter than the inner, fringed with hairs and with membranous margins. Ligules of outer flowers white or yellow, narrow, strap-shaped. Fruit (achene) $\frac{1}{3}$-$\frac{2}{3}$ in. long, linear, quadrangular, slightly tapering towards the tip, with 2-4 short, stout awns covered with bent back hooks.

Flowers.—August, September.

Locality.—Temperate region.

Distribution.—Throughout India, Ceylon and most warm countries.

ALLARDIA, Dcne.

Flowers white-rosy or lilac.

I. Pappus $\frac{1}{3}$ in. long *A. glabra.*

II. Pappus not more than $\frac{1}{4}$ in. long.

1. Fruit (achenes) glandular *A. vestita.*
2. Fruit not glandular, grooved and wrinkled *A. tomentosa.*

Fig. 2. Allardia glabra, Dcne.

A densely tufted perennial herb, strongly aromatic, hairless or sparingly woolly. Leaves $\frac{1}{2}$-$\frac{3}{4}$ in. long, cuneiform, 3-fid, lobes linear, entire or toothed. Heads 1-1$\frac{1}{2}$ in. diameter, stalkless. Outer bracts woolly, herbaceous, with purple membranous margins. Pappus $\frac{1}{3}$ in. long, of the outer flowers (ray-flowers) scanty, of the inner flowers copious, brown,

bristles slender, unequal, flat, rigid, shining, not dilated upwards, here and there split, tips sharp-pointed.

Flowers.—July.

Locality.—Above Zoji La; Ladakh.

Distribution.—Alpine Himalaya, from Kashmir to Sikkim, E. and W. Tibet, 15,000-18,000 ft.

Allardia vestita, Hook. f. & T.

General appearance the same as that of *Allardia glabra*, but the plant is densely and thickly covered with buff or whitish wool. Leaves wedge-shaped, 3-5-fid, lobes short, blunt. Heads short-stalked, $\frac{3}{4}$-1 in. diameter. Bracts surrounding the flower-heads membranous with a broad, pale brown, deeply fringed margin. Fruit (achene) glandular. Pappus short, yellowish, scarcely $\frac{1}{4}$ in. long, hairs with dilated tips.

Locality.—Zaskar, 15,000-16,000 ft.

Distribution.—Apparently endemic in Kashmir.

Fig. 3. Allardia tomentosa, Dcne.

A loosely tufted perennial herb, covered with soft white wool. Branches ascending, 4-8 in. high, naked in the upper part. Leaves $1\frac{1}{2}$-3 in. long, very variable, oblong or linear-oblong, 1-2-pinnatifid. Heads 2-3 in. diameter, stalked. Bracts woolly. Ligules of outer flowers very many, linear, 1 in. long, entire. Fruit (achene) grooved and wrinkled, pale. Pappus $\frac{1}{6}$-$\frac{1}{4}$ in. long, bristles flattened, whitish or yellowish, with purplish often dilated tips.

Flowers.—July.

Locality.—Lokut Gumber Nar.

Distribution.—Alpine W. Himalaya, from Kashmir to Kumaon, 13,000-16,000 ft.

TANACETUM, Linn. The Tansy.

Flowers yellow.

A. Leaves basal and on the stem.
 I. Leaves 6-18 in. *T. longifolium.*
 II. Leaves 2-4 in. *T. Falconeri.*
B. Leaves all on the stem.
 I. Leaves over 10 in. high.
 1. Bracts hairless.
 a. Heads $\frac{1}{4}$ in. diameter *T. fruticulosum.*
 b. Heads $\frac{1}{6}$ in. diameter *T. gracile.*
 2. Bracteoles hairy *T. artemisioides.*
 II. Leaves 1-4 in. high *T. tibeticum.*

Fig. 4. **Tanacetum longifolium**, Wall. Long-leaved Tansy.

A hairy perennial herb. Stem 6-18 in. high, stout, erect, streaked, not angled, leafy, densely hairy towards the top. Leaves 6-18, mostly basal, far overtopping the flowers, slender, linear in outline, twice pinnately cut; segments almost filiform. Heads ⅛-½ in. diameter, in a close woolly corymb or rounded cluster, if solitary often 1 in. diameter. Bracts surrounding the flower-heads very many, hairy, narrowly oblong, with a broad membranous purple margin. Flowers bright yellow, 50-60, with the achene ¼ in. long. Fruit (achene) narrowly inversely egg-shaped, with 5 ribs. Pappus absent.

Flowers.—July, August.

Locality.—Gangabal.

Distribution.—W. Himalaya, from Kashmir to Kumaon, 10,000-13,500 ft.

Tanacetum Falconeri, Hook. f. Falconer's Tansy.

A tall robust hairy herb. Stem 1-2 ft. high, grooved. Basal leaves 2-4 in. long, linear-oblong in outline, twice pinnately cut; segments linear, narrow, sharp-pointed. Flower-heads ⅓ in. diameter, stalked in branched corymbs with linear or divided leaves. Bracts surrounding the flower-heads hairy, linear-oblong, margins narrowly membranous, pale. Flowers yellow, about 20 to the head. Corolla about ¼ in. long. Fruit (achene) pale, linear-oblong, rather broadened upwards, tip truncate and lobed.

Flowers.—July.

Locality.—Below Sonamarg.

Distribution.—Apparently endemic in Kashmir.

Tanacetum fruticulosum, Ledeb.

A very hairy perennial herb. Stems many from the woody root, 10-14 in. high, erect, leafy upwards. Leaves all on the stem (not basal), ¼-½ in. long, once or twice pinnately cut, segments spreading, linear, blunt. Heads many, stalked or stalkless, ¼ in. diameter. Bracts surrounding the flower-heads broadly oblong, nearly hairless, all membranous and pale, or margins faintly coloured.

Locality.—Alpine regions.

Distribution.—W. Himalaya, 12,000-15,000 ft., Afghanistan, Altai Mts.

Tanacetum artemisioides, Hook. f.

A very hairy herb. Stem 1-2 ft. high, slender, naked below, sparsely leafy, ribbed, simple or branched above, sometimes much branched from the base. Branches long, slender, sparsely leafy, ribbed, greenish grey. Leaves ½-1 in. long, once or twice pinnately cut, segments short, broad, blunt. Heads ½ in. diameter, stalkless in a cluster, or stalked in a small flat-topped corymb, rarely 1 in. diameter. Flowers yellow, about 20. Bracts broadly oblong, concave, leathery, hairy, all pale.

This species can be distinguished from *T. fruticulosum* by the broader leaf-segments and hairy bracts.

Locality.—Baltistan, 8,000-9,000 ft.

Distribution.—Apparently endemic in Kashmir.

Tanacetum gracile, Hook. f. & T.

A very hairy herb. Stems 1-2 ft. high, very slender, many from a woody stock, branched above. Branches slender, spreading. Leaves ½-1 in., few, scattered, twice pinnately cut, segments very slender. Heads ⅛ in. diameter, in small corymbs at the end of the branches. Bracts broadly oblong, membranous, hairless, pale. Fruit (achene) inversely egg-shaped with a terminal cupula.

Nearly related to *T. artemisioides*, but the whole plant is much more slender, the leaf-segments are narrower, the heads smaller, and the bracts hairless.

Locality.—Ladakh, 11,000-12,000 ft.

Distribution.—Alpine W. Himalaya, from Kashmir to N. of Kumaon, 13,500 ft.

Tanacetum tibeticum, Hook. f. & T.

A dwarf hairy herb. Stems very many, 1-4 in. high, crowded on a stout stock, leafy upwards. Leaves ½ in. long, crowded, palmately cut, segments short, linear, blunt. Heads ⅛-½ in. diameter, in a cluster or corymb. Bracts round, hairy, with broad, coloured or pale, membranous margins. Flowers, including the achenes, 1/12 in. long. Fruit (achene) 5-ribbed, with a small terminal cup.

Locality.—Lanak Pass, 15,000-17,000 ft.

Distribution.—Alpine W. Himalaya.

ARTEMISIA, Linn. Wormwood.

A. Outer flowers of flower-head female, inner flowers bisexual, all fertile; receptacle (broadened top of stalk on which the flowers are inserted) naked.
 I. Leaves quite simple *A. amygdalina.*
 II. Leaves not simple.
 1. Flower-heads not more than $\frac{1}{6}$ in. long.
 a. Strongly aromatic *A. vulgaris.*
 b. Not strongly aromatic.
 i. Plant quite hairless ... *A. Tournefortiana.*
 ii. Plant hairy.
 A. Heads 6-10-flowered ... *A. vestita.*
 B. Heads 15-20-flowered *A. laciniata.*
 2. Flower-heads larger, up to $\frac{1}{3}$ in. diameter.
 a. Flower-heads up to $\frac{1}{4}$ in. diameter *A. Moorcroftiana.*
 b. Flower-heads $\frac{1}{3}$ in. diameter *A. Stracheyi.*
B. All the flowers of flower-head bisexual and fertile; receptacle naked ... *A. maritima.*
C. Outer flowers of flower-head female, inner flowers bisexual and sterile; receptacle naked.
 I. Lower leaves quite entire or absent *A. dracunculus.*
 II. Lower leaves stalkless, simple, cuneate, with a toothed or lobed tip... *A. japonica.*
 III. Lower leaves stalked, once or twice pinnately cut *A. scoparia.*
D. Outer flowers of flower-head female, inner flowers bisexual, all fertile; receptacle covered with long hairs.
 I. Flower-heads $\frac{1}{4}$-$\frac{1}{3}$ in. *A. absinthium.*
 II. Flower-heads $\frac{1}{4}$-$\frac{1}{2}$ in. *A. Sieversiana.*

Fig. 5. Artemisia amygdalina, Dcne.

A perennial plant. Stem stout, erect, leafy, deeply-grooved, many-ribbed, hairless. Leaves 4-6 by $\frac{1}{2}$-$1\frac{1}{4}$ in., simple, almost stalkless, lance-shaped, long-pointed, hairless above, very hairy beneath, toothed, teeth bent inwards, gland-tipped, rather membranous, nerves many, midrib slender, base narrowed into a very short petiole with very small bristle-shaped lobes. (The leaves resemble those of a Willow.) Flower-heads $\frac{1}{10}$ in.,

few-flowered, egg-shaped in dense short axillary racemes. Bracts oblong, blunt, membranous, hairless, outer ones with a green disk.

Flowers.—July.

Locality.—Pir Panjal; Kamri Valley; Minimarg; Gangabal.

Distribution.—So far known from Kashmir only.

Artemisia vulgaris, Linn. Mugwort.

A perennial herb, shrubby, aromatic, 2-8 ft. high, more or less hairy. Stems leafy, branched. Lower leaves 2-4 by 1-2 in., stalked, egg-shaped in outline, with lobes at the base, deeply pinnately cut, the segments entire, toothed or again pinnately cut, all finely hairy above, white-hairy beneath. Upper leaves smaller, 3-fid or entire, lance-shaped. Heads $\frac{1}{8}$-$\frac{1}{6}$ in. long, egg-shaped or almost round, reddish, or yellowish-brown, or cream-white, solitary or 2 or 3 together, stalkless or very shortly stalked in panicled racemes. Corollas of the outer (ray-) flowers cylindrical, slender. Bracts hairy with membranous margins, the outer egg-shaped, sharp-pointed, the inner oblong, blunt, much larger than the outer, sometimes entirely membranous. Fruit (achene) oblong-ellipsoid, very small.

Flowers.—July, August.

Locality.—At elevations of 5,000-12,000 ft.

Distribution.—W. Himalaya to Sikkim (5,000-8,000 ft.), Assam, Burma, Mt. Abu, hills of W. and S. India, Ceylon, Europe, N. Asia, Malay Islands, Siam, China, Japan.

Artemisia Tournefortiana, Reichb.

A stout, erect, hairless annual. Stem 2-4 ft. high, simple or branched, green or purplish. Leaves 3-5 in. long, linear-oblong or egg-shaped, pinnately cut, leaf-axis with small lobes, segments distant, oblong, toothed, irregularly or pinnately cut. Heads $\frac{1}{8}$ in. long, egg-shaped, erect, in very dense, axillary, erect, compound panicles, resembling the inflorescence of an Amaranth. Bracts hairless, erect after flowering, inversely egg-shaped-oblong, sharply pointed, membranous, with a narrow green disk. Fruit (achene) $\frac{1}{30}$ in. long.

Locality.—At elevations of 8,000-12,000 ft.

Distribution.—Temperate and subalpine W. Himalaya, from Kashmir to Kunawer and Spiti, Afghanistan to Armenia.

Artemisia vestita, Wall. Collett, fig. 79.

A shrubby, erect, hairy perennial, branched. Stems 1-4 ft. high, grooved. Leaves 1-4 in. long, fern-like, twice pinnate; ultimate segments narrowly oblong, closely pinnatifid, lobes

sharp-pointed; upper surface dark green, slightly hairy, lower white-hairy. Leaf-axis winged, wings closely pinnatifid, segments uniform, sharp-pointed, comb-like. Heads 6-10-flowered, hemispheric, $\frac{1}{8}$-$\frac{1}{6}$ in.; long-stalked, nodding in short or long, compound, hairy racemes. Bracts inversely egg-shaped-oblong, membranous, outer with a green disk. Fruit (achene) ellipsoid, smooth, shining, brown.

Locality.—Temperate region, 7,000-10,000 ft.

Distribution.—Afghanistan, Salt Range, from Peshawar and Kashmir to Kumaon, N. China.

Artemisia laciniata, Willd.

An erect, hairy, perennial herb. Leaves broadly egg-shaped, several times pinnately cut; segments cut in comb-like fashion, slightly hairy on both sides, leaf-axis simple. Heads 15-20-flowered, broadly hemispheric, nodding, distant, in slender panicled racemes. Bracts very hairy, with a broad membranous margin and a green disk.

Locality.—Temperate regions, up to 9,500 ft.

Distribution.—W. Himalaya, from Kashmir to Kumaon, 8,000-12,000 ft., Siberia, Dahuria.

Artemisia Moorcroftiana, Wall. Moorcroft's Wormwood.

A very hairy perennial. Rootstock creeping. Stem simple below. Leaves egg-shaped or oblong, twice pinnate, white-hairy beneath; leaf-axis pinnatifid, segments egg-shaped or lance-shaped, sharp-pointed, spreading. Flower-heads large, $\frac{1}{8}$-$\frac{1}{4}$ in. diameter, broadly hemispheric, 15-20-flowered, stalkless, forming interrupted spikes or racemes, with spaces of $\frac{1}{4}$-$\frac{3}{4}$ in. between the solitary heads or clusters of 2-3 heads. Flowers purple. Bracts inversely egg-shaped, hairy, broadly membranous. Fruit (achene) $\frac{1}{24}$ in. long.

Locality.—Temperate and alpine regions.

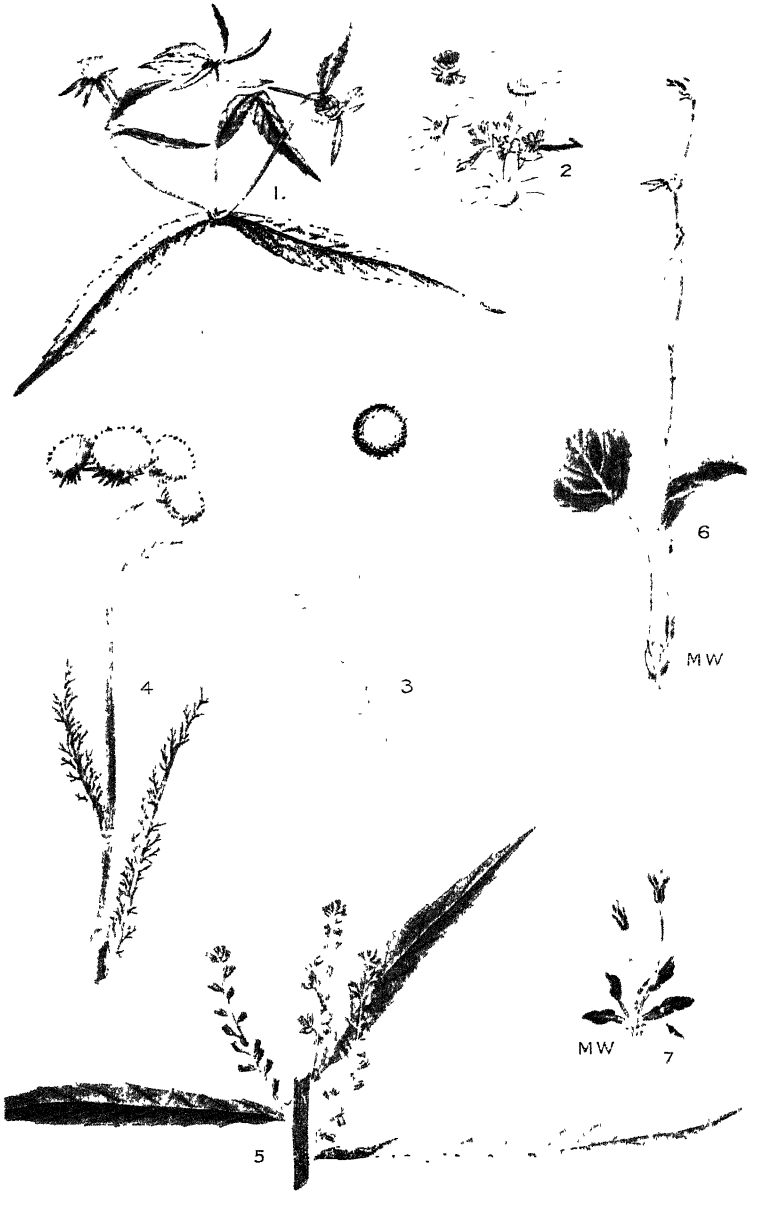
Distribution.—From Kashmir to Kunawer, up to 14,000 ft.

Artemisia Stracheyi, Hook. f. & T.

A dwarf, hairy perennial. Branches annual, simple, erect, stout, from a large woody branched rootstock. Leaves 3-6 in. long, linear-oblong, twice pinnately cut, hairy on both surfaces, segments close-set, short, linear or lance-shaped. Heads $\frac{1}{3}$ in. diameter, hemispheric, short-stalked, nodding, forming a simple, stout, leafless raceme at the end of the branches. Bracts many, inversely egg-shaped, hairy, with broad, brown, membranous margins. Corolla very hairy. Fruit (achene) $\frac{1}{12}$ in. long, wedge-shaped, compressed.

Locality.—Lanak Pass and Valley, 15,000-17,000 ft.

Distribution.—Alpine W. Himalaya.



FIGS.—1, *Bidens cernua*, Linn.; 2, *Allardia glabra*, Dcne.; 3, *Allardia tomentosa*, Dcne.; 4, *Tanacetum longifolium*, Wall.; 5, *Artemisia amygdalina*, Dcne.; 6, *Ainsliaea pteropoda*, DC.; 7, *Gerbera lanuginosa*, Benth.

Artemisia maritima, Linn. Sea Wormwood.

An erect, prostrate or ascending, hairy perennial, shrubby below. Rootstock woody, branched. Stems 6-18 in. high, woody or wiry. Leaves ½-2 in. long, often quite white, egg-shaped, twice pinnately cut; segments small, spreading, linear, blunt, upper ones simple, linear; stalk slender. Flower-heads 3-8-flowered, few, egg-shaped or oblong, in short panicle-like spikes, the flowers often reddish, all fertile, narrow. Bracts oblong; the outer herbaceous, hairy; inner membranous, sharp-pointed, hairless.

Flowers.—August.

Locality.—The most abundant plant on the hill-sides about Gilgit; Astor.

Distribution.—W. Himalaya, from Kashmir to Kumaon, 7,000-9,000 ft., in salt plains of W. Tibet, 9,000-14,000 ft., saline tracts of N. Asia, round the Mediterranean, W. Europe.

Artemisia dracunculus, Linn.

A perennial, green, erect, hairless herb. Stems 1-2 ft. high, grooved and ribbed. Leaves 1-1½ in. long; basal ones quite entire or absent; stem-leaves stalkless, linear or linear-oblong, sharp-pointed or toothed. Flower-heads almost round, ⅛ in. diameter, stalkless or stalked, pale, shining, in panicled racemes, sometimes clustered in threes, horizontal or nodding. Flowers numerous. Bracts hairless, broadly oblong, blunt, with broad membranous margins and a green disk.

Locality.—Alpine regions.

Distribution.—W. Himalaya, 14,000-16,000 ft., Afghanistan, W. Asia, S. and Central Russia.

Artemisia japonica, Thunb. (= A. parviflora, Buch.). Small-flowered Wormwood.

A shrubby inodorous herb. Stem 1-3 ft. high. ascending; branches numerous, slender. Leaves 1-2 by ½-¾ in., stalkless; the lower usually simple, wedge-shaped, with a variously toothed or lobed tip and with some linear lobes at the base, deep green on both sides, hairless or slightly hairy. Heads very numerous, stalked, $\frac{1}{10}$-⅛ in. diameter, globose, in panicled racemes, drooping, greenish. Outer flowers female, fertile, inner ones bisexual, sterile. Bracts hairless or nearly so, egg-shaped, sharp-pointed, with membranous margins, the outer much smaller than the inner. Fruit (achene) very small, ellipsoid, brown.

Locality.—Temperate regions, 7,000-9,000 ft.

Distribution.—Throughout the greater part of India at elevations from 3,000-10,000 ft.

Artemisia scoparia, Waldst. & Kit.

An annual or biennial herb, 1-3 ft. high, faintly odorous. Stem slender, erect, grooved, purplish, hairless or more or less hairy, simple at the base, branched above. Branches sometimes almost capillary, purplish. Leaves deep green; the basal ones stalked, egg-shaped in outline, twice or thrice pinnately cut, segments linear; cauline leaves filiform. Heads $\frac{1}{12}$-$\frac{1}{10}$ in. diameter, stalkless or on short capillary stalks, forming slender panicled cymes. Female flowers in each head fertile, with very small corollas, bisexual flowers sterile, with much larger corollas. Bracts glistening, egg-shaped-oblong, blunt, with broad membranous margins, the inner bracts about twice as large as the outer. Fruit (achene) ellipsoid, about $\frac{1}{60}$ in. long.

Locality.—Temperate regions, 5,000-7,000 ft.

Distribution.—Central Europe, Afghanistan, W. Himalaya, Punjab, Sind, Upper Gangetic plain, Japan.

Artemisia absinthium, Linn. Absinth, Maderwort, Old Woman, Warmot, Wormwood.

A perennial, hairy herb. Stem 1-3 ft. high, erect, angular and ribbed. Leaves 1-2 in. long, egg-shaped or inversely egg-shaped, unequally twice or thrice pinnately cut into spreading linear or lance-shaped, blunt segments, hairy on both surfaces, basal and lower stem-leaves narrowed into winged stalks. Heads yellow, numerous, about $\frac{1}{4}$-$\frac{1}{3}$ in. diameter, stalked, hemispheric, in drooping racemes at the end of the branches. Outer flowers, which are small, producing fruit. Outer bracts oblong, hairy, narrowly membranous, inner round, broadly membranous. Corolla of outer flowers broadened below. Fruit (achene) elliptic-oblong or somewhat inversely egg-shaped, $\frac{1}{24}$ in. long.

Flowers.—June.

Locality.—Near road to Pandrenthar.

Distribution.—Kashmir, 5,000-7,000 ft., N. Asia, from Afghanistan to the Atlantic.

Artemisia Sieversiana, Willd.

An annual or biennial hairy herb. Stem erect, angled, ribbed, simple or branched above. Leaves mostly stalked, broadly egg-shaped, twice pinnately cut, segments blunt and obscurely lobed, hairy on both surfaces. Flower-heads $\frac{1}{4}$-$\frac{1}{2}$ in. diameter, hemispheric, stalked, nodding, distant in lax long

racemes at the end of the branches. Outer bracts green, hairy, inner ones broadly membranous.

Locality.—At elevations from 8,000-14,000 ft.; Baltistan.

Distribution.—Temperate and alpine W. Himalaya, from Kashmir to Lahul, and from S. Russia to China.

AINSLIAEA, DC.

I. Leaf-stalks winged. Heads in spikes ... *A. pteropoda.*
II. Leaf-stalks not winged. Heads in small clusters *A. aptera.*

Fig. 6. Ainsliaea pteropoda, DC.

A hairy, perennial herb. Stem 1-3 ft. high. Lower leaves 2-5 by 1½-3 in., egg-shaped or heart-shaped, sharp- or long-pointed, sparsely hairy or white-hairy beneath, obscurely crenate; stalk winged, as long as the blade; stem-leaves few, small, lance-shaped. Heads ½ in. long, 3-flowered, solitary or in fascicles. Bracts lance-shaped. Fruit (achene) ⅕ in. long, inversely lance-shaped, silky. Pappus ⅓ in. long, pale brown.

Flowers.—May, June.

Fruit.—September.

Locality.—Gulmarg, wooded hill-sides, above 8,000 ft., common.

Distribution.—Temperate Himalaya, Kashmir to Bhutan and Mishmi Hills, 5,000-8,000 ft., Khasia Hills, 5,000-7,000 ft., Martaban, Tenasserim.

Ainsliaea aptera, DC. Collett, fig. 82.

A hairy perennial plant. Stem 1-4 ft. high; generally stout and red-brown. Leaves 4 by 4½ in., sometimes 7 in. long and broad, long-stalked, triangular- or round-heart-shaped, sharp-pointed, sinuate-lobed or -toothed, hairless or densely hairy; stalk 3-7 in. long, hairless or hairy. Flower-heads ½-¾ in. long, almost stalkless, or on stiff, slender stalks, usually hairless, forming interrupted spikes or spreading panicles. Corolla ⅓ in. long. Fruit ¼ in. long, inversely lance-shaped, silky, indistinctly 10-ribbed. Pappus ⅓ in. long, brown.

Flowers.—May.

Locality.—Tanmarg forest, 7,800 ft.; Gulmarg.

Distribution.—Temperate Himalaya, from Kashmir to Sikkim (up to 10,000 ft.) and Bhutan (5,000-8,000 ft.), Khasia Hills, 4,000-5,000 ft.

GERBERA, Gronov.

I. Bracts surrounding the flower-heads woolly outside *G. lanuginosa.*
II. Bracts hairless outside *G. Kunzeana.*

Fig. 7. **Gerbera lanuginosa**, Benth. (including var. **pusilla**, Hook. f.). Collett, fig. 83.

Flowering stem 4-12 in. high, sometimes not more than ½ in., cottony, slender. Leaves all basal, lance-shaped or inversely lance-shaped, or inversely egg-shaped, sharp- or long-pointed, often pinnately lobed near the base, rarely entire, usually toothed or sinuately lobed, hairless and shining above, densely cottony beneath, 2-6 by ¾-1½ in. (in extremes 7-10 by 3-3½ or ½-1 in. long); stalks winged at the top, silky at the base. Heads 1-2½ in. diameter. Bracts woolly outside, outer ones egg-shaped, inner ones linear-lance-shaped, long-pointed. Flowers white, often tinged with pink; ligules ½ in. long. Fruit (achene) ¼ in. long, slightly hairy, ribbed. Pappus white, rough with small barbs.

Flowers.—June.

Locality.—Above Gulmarg, in short grass on hill-side, above 9,000 ft., common.

Distribution.—Temperate W. Himalaya, from Kashmir to Kumaon, 4,000-9,500 ft.

Gerbera Kunzeana, Braun & Aschers.

With regard to habit and foliage this species resembles *Gerbera lanuginosa*, but the following points distinguish it: Flower-heads cylindric, ½-¾ in. diameter. Flowering stem with numerous, long, thread-like bracts. Bracts surrounding the flower-heads broadly lance-shaped, hairless. Corolla of inner flowers sometimes 5-toothed instead of 2-tipped. Fruit (achene) hairy. Pappus brown, smooth.

Locality.—Temperate regions.

Distribution.—Temperate Himalaya, from Kashmir to Bhutan, 7,000-12,000 ft.

Plate 31

CREMANTHODIUM, Benth.

Fig. 1. Cremanthodium Decaisnei, C. B. Clarke. Coventry pl. XXV.

A hairy, perennial herb. Flowering stem 6-10 in. high. Basal leaves 1-2 in. diameter, kidney-shaped, crenate, more or less hairless above, hairy below, stalk 1-4 in. long; stem-leaves similar, but smaller, thickened above, with a sheaf clasping the stem below. Flowers in a solitary, nodding head, 1½-2½ in. diameter. The outer flowers with ligules ¾-1 by ¼ in., with 3 short teeth at the tip, yellow; central flowers tubular, dark brown. Bracts forming 1 row, ¼-⅔ in. long, red-brown. Fruit (achene) narrow, slender. Pappus white.

Flowers.—July, August.

Locality.—Aporwat above Gulmarg, damp rocky ground, above 12,000 ft., common; Thajwas.

Distribution.—Alpine Himalaya, from Kashmir (11,000-12,000 ft.), to Kumaon (15,000 ft.) and Sikkim (14,000-16,000 ft.).

DORONICUM, Linn. The Leopard's Bane.

I. Heads 1-2 in. diameter *D. Roylei.*
II. Heads 2-3 in. diameter *D. Falconeri.*

Fig. 2. Doronicum Roylei, DC. Royle's Leopard's Bane.

An erect, perennial herb. Stem 2-4 ft. high, branched above, more or less hairy. Leaves 4-5 in. long, broadly egg-shaped, sinuate toothed, acute, rounded or heart-shaped at the base, basal leaves with a stalk 4-6 in. long, upper ones stem-clasping. Flower-heads yellow, few or many, 1-2 in. diameter, glandular-hairy on slender stalks swollen at the tip. Bracts ½-⅔ in. long, long-pointed. Ligules nearly as long. Fruit (achene) deeply grooved, all hairless, or the outer sparingly hairy. Pappus short, reddish, only on the inner flowers.

Flowers.—July.

Locality.—Gulmarg, damp wooded hill-side, above 8,000 ft., common; Baltal.

Distribution.—W. Himalaya, from Kashmir to Garhwal, up to 10,000 ft.

Doronicum Falconeri, Hook. f. Falconer's Leopard's Bane.

A stout perennial herb. Stem simple, more or less hairy, nearly naked above. Leaves, including the stalk, 5-6 in. long, varying in breadth, inversely egg-shaped or spoon-shaped,

toothed. Flower-heads 2-3 in. diameter, glandular-hairy. Bracts linear-lance-shaped. Ligules many, yellow, longer than the bracts. Pappus short, only on the inner flowers.

Locality.—Karakoram, 14,000 ft.

Distribution.—Alpine W. Himalaya.

SENECIO, Linn. The Ragwort.

A. Anther-cells blunt at the base (not prolonged downwards into tails).
 I. Basal leaves very broad, round or kidney-shaped.
 1. Achenes $\frac{1}{3}$ in. long.
 a. Achenes deeply grooved, much longer than the pappus ($\frac{1}{16}$ in.) *S. Jacquemontianus.*
 b. Achenes longer than the reddish pappus *S. ligularia.*
 2. Achenes $\frac{1}{4}$ in. long.
 a. Achenes shorter than the whitish pappus *S. arnicoides.*
 b. Achenes hairless, as long as the white pappus ... *S. Thomsoni.*
 3. Achenes $\frac{1}{5}$ in. long, hairless, shorter than the red-brown pappus *S. amplexicaulis.*
 II. Basal leaves not very broad or round or kidney-shaped.
 1. Bracts between 10 and 20.
 a. Stem 2-6 ft. Bracts 10-12 *S. chrysanthemoides.*
 b. Stem $\frac{1}{2}$-3 ft.
 i. Bracts 10-16.
 A. Having basal and stem-leaves ... *S. nudicaulis.*
 B. Having only stem-leaves *S. pedunculatus.*
 ii. Bracts 15-20 *S. coronopifolius.*
 c. Stem 2-6 in. *S. dubius.*
 2. Bracts 5-7 *S. graciliflorus.*

B. Anther-cells prolonged downwards into tails.
 I. Bracts 5. Ligules none. Pappus white *S. Levingii.*
 II. Bracts 3-5. Ligules none. Pappus brown *S. chenopodifolius.*
 III. Bracts 5-8. Ligules 5-7. Pappus white *S. Kunthianus.*

Fig. 3. **Senecio Jacquemontianus**, Benth. Jacquemont's Ragwort.

A robust, hairless, perennial herb. Stems 3-5 ft. high. Leaves 1 ft. broad and less, broadly egg-heart-shaped or almost halbert-shaped, blunt or sharp-pointed, toothed; stalk of lower leaves 5-15 in. long, stout, winged, wing narrow or broad, gashed or toothed, of stem-leaves sheathing. Heads many, stalked, 1½-2 in. across the ligules, forming racemes 4-8 in. long which become longer in fruit, stalks curved, 1-2½ in. long, lower with oblong leafy bracts at the base. Bracteoles under the heads few, filiform. Bracts immediately surrounding the flower-heads 8-12, oblong, sharp-pointed, ⅓ in. long, hairless, bases slightly united. Ligules yellow, 12-15, long and broad, ½-¾ in. long, 5-9-nerved, entire or toothed at the tip. Fruit (achene) ⅛ in. long, deeply grooved, linear-oblong. Pappus-hairs $\frac{1}{16}$ in. long, unequal, united at the base.

Flowers.—July.

Locality.—Below Gulmarg, watercourses, about 8,000 ft.; also in alpine regions.

Distribution. — Apparently endemic in Kashmir, 8,000-13,000 ft.

Senecio ligularia, Hook, f.

A stout, erect, perennial herb, hairless or cottony above. Leaves 1 ft. diameter and less, heart-arrow-shaped or almost triangular or kidney-shaped, blunt or sharp-pointed, coarsely toothed, stalk of lower ones long, simple, of upper ones winged and sheathing. Flower-heads numerous, many-flowered, forming a solitary, simple raceme. Bracts at the base of the stalks small or large, leafy. Bracts surrounding the heads 8-10, outer narrow, sharp-pointed, inner ones broad with broad, membranous, overlapping margins. Ligules of outer flowers several, ½-¾ in., tube of inner flowers as long as the bell-shaped limb. Fruit (achene) ⅛ in. long, narrow, longer than the reddish pappus.

Locality.—Abundant on high levels of temperate regions.

Distribution.—Temperate and subalpine Himalaya, from Kashmir to Sikkim, 9,000-12,000 ft., Siberia, Dahuria, Japan.

Senecio arnicoides, Wall.

A stout, erect, more or less hairless, perennial herb. Stem 12-18 in. high. Leaves up to 8 by 5 in., leathery, oblong, egg-shaped or elliptic, blunt, toothed, lower ones narrowed into the stout stalk which is winged above; stem-leaves stalkless, stem-clasping or with a sheathing stalk. Heads solitary

or 2 or more in simple or branched racemes, sometimes 2½ in. diameter, broadly bell-shaped. Bracts surrounding the heads 14-16, oblong, sharp-pointed, united at the base, ¾ in. long. Ligules of outer flowers 15-30, short, broad, ¾ in. long, 7-11-nerved, entire or minutely toothed at the tip. Tube of inner flowers shorter than the limb. Fruit (achene) ¼ in. long, broader upwards, shorter than the whitish pappus.

Locality.—Alpine regions.

Distribution.—W. and C. Himalaya, from Kashmir to Nepal, 12,000-14,000 ft.

Senecio Thomsoni, C. B. Clarke. Thomson's Ragwort.

A robust perennial, hairless below, hairless or cottony above. Stem 3-4 ft. high. Leaves 10 in. diameter and less, round, halbert- or heart-shaped, toothed, stalk of lower leaves slender, not winged. Flower-heads 5-6-flowered in very variable corymbs, almost erect or drooping; the axils of the corymbs with linear or filiform bracts. Bracts surrounding the heads 5-6, ½ in. long, linear-oblong, free, sharp-pointed, hairless. Ligules 1-2, ¾ in. long. Fruit (achene) ¼ in. long, narrow, hairless, as long as the white pappus.

Locality.—Temperate regions, 7,000-10,000 ft.

Distribution.—Apparently endemic in Kashmir.

Senecio amplexicaulis, Wall.

A very stout, almost hairless, perennial herb. Stem 2-4 ft. high. Leaves 1 ft. diameter and under, round-kidney-shaped, heart- or almost halbert-shaped, toothed; stalk of lower ones long, simple or winged, of upper with a broad, sheathing wing. Flower-heads many-flowered, drooping, bell-shaped, forming corymbs, branches of corymb slightly hairy. Bracts surrounding the heads ¼-⅓ in. long, about 8, united at the base, oblong, sharp-pointed, hairless. Ligules of outer flowers 5-6, very long, ½-¾ in., slender; tube of inner flowers longer than the bell-shaped limb. Fruit (achene) ⅕ in. long, hairless, shorter than the red-brown pappus.

Locality.—Temperate and subalpine regions.

Distribution.—W. Himalaya, from Kashmir to Garhwal, 9,000-13,000 ft., Sikkim, 16,000 ft.

Fig. 4. Senecio chrysanthemoides, DC.

A herb, hairless below, hairy upwards. Stems 2-6 ft. high, robust, erect, streaked, usually much branched. Lower leaves 6-9 by 3-4 in., pinnately divided into broad, toothed lobes, end-lobe much the largest, egg-shaped, irregularly lobed and toothed,



FIGS.—1, *Cremanthodium Decaisnei*, Clarke; 2, *Doronicum Roylei*, DC.; 3, *Senecio Jacquemontianus*, Benth.; 4, *Senecio chrysanthemoides*, DC.; 5, *Senecio chrysanthemoides*, DC., var. *chrysanthemoides proper*, Hook. f.

lower leaves sometimes reduced to an egg-shaped or oblong, crenate blade, basal lobes lobed and toothed, stem-clasping. Upper leaves stalkless, 1-9 by ½-4 in., stem-clasping, lobes more numerous. Heads ½ in. diameter, many, many-flowered, in large spreading corymbs. Bracts surrounding the heads 10-12, ⅛-¼ in., oblong, sharp-pointed. Ligules of outer flowers 8-12, conspicuous, 3-toothed. Fruit (achene) hairless or slightly hairy, $\frac{1}{10}$ in., strongly ribbed, all with white pappus or the outer ones (of the ray-flowers) without pappus.

A very variable plant as to hairiness of the various parts and the presence of the pappus.

Flowers.—August, September.

Locality.—Gulmarg, open margs, above 8,000 ft., common.

Distribution. — Temperate and alpine Himalaya, from Kashmir to Sikkim, 8,000-13,000 ft., Khasia Hills, 4,000-5,000 ft.

Fig. 5. Senecio chrysanthemoides, DC. var. **chrysanthemoides** proper, Hook. f.

Closely resembling *S. chrysanthemoides.* Lower leaves hairless, lyrate-pinnatifid. Upper leaves stalkless, stem-clasping. Heads many, glabrescent. Fruit (achene) hairless, all with a pappus.

Flowers.—August.

Locality.—Above Gulmarg, open hill-sides and margs, above 10,000 ft.

Distribution.—Temperate Himalaya, from Kashmir to Nepal.

Senecio nudicaulis, Ham.

A hairless or sparsely hairy herb. Stems 6 in. to 3 ft. high, grooved. Leaves nearly hairless above, white or purple-hairy below, inversely egg-shaped or spoon-shaped, blunt, 2-3 in., crenate or sharply toothed. Basal leaves spreading, narrowed into a winged stalk; stem-leaves few, distant, stalkless, basal lobes stem-clasping. Heads ⅓ in. diameter, broadly bell-shaped, many-flowered, in corymbs. Bracts surrounding the heads 10-14, egg-shaped, sharp-pointed, 3-nerved along the centre, margins broad, membranous. Ligules of outer flowers conspicuous, long, narrow, 3-toothed. Fruit (achene) slightly hairy, all with a whitish pappus.

Locality.—Temperate region.

Distribution.—Temperate Himalaya, 5,000-10,000 ft., from Waziristan to Sikkim.

Senecio pedunculatus, Edgew.

A dwarf, hairless, annual herb. Stem 6-18 in. high, slender, much branched from the base. Leaves all on the stem, pinnatifid; lobes linear, spreading, base simple or dilated and

half-stem-clasping. Heads $\frac{1}{6}$ in. diameter, many-flowered, narrowly bell-shaped, stalked, in loose corymbs. Bracts surrounding the heads 10-16, linear, long-pointed. Ligules of outer flowers very short. Fruit (achene) slender, hairless or nearly so. Pappus white.

Flowers.—July.

Locality.—On rocks below Sonamarg.

Distribution.—Temperate and alpine W. Himalaya, from Kashmir to Garhwal, 9,000-13,000 ft.

Senecio coronopifolius, Desf.

An annual, slender, hairless herb. Stem 6-18 in., often very many from the root, branches erect or spreading. Leaves scattered, 1-2 in., all on the stem, fleshy, narrow, pinnatifid, lower stalked, upper stem-clasping with 2 lobes at the base. Heads few, $\frac{1}{3}$ in. diameter, many-flowered, long-stalked. Bracts surrounding the heads 15-20, narrow, sharp-pointed. Ligules of outer flowers 8-12, bent back; corollas of inner flowers very slender. Fruit (achene) rough. Pappus white.

Locality.—Temperate and alpine region.

Distribution.—W. Himalaya, from Kashmir to Kunawer, 8,000-17,000 ft., from Afghanistan to Spain.

Senecio dubius, Ledeb.

A dwarf, hairless, annual herb, 2-6 in. high, branched from the base. Leaves often half as long as the plant, stalkless, or the upper lobed at the base, linear, entire or sparingly pinnatifidly lobed. Flower-heads $\frac{1}{4}$ in. diameter, many-flowered, almost bell-shaped. Bracts surrounding the heads 12-16, linear-oblong, green, with sharp-pointed, purple tips and white margins. Ligules none. Fruit (achene) very hairy. Pappus white.

Locality.—Pirrang Pass, 15,000-17,000 ft., also temperate region.

Distribution.—W. Himalaya, 9,000-17,000 ft.

Senecio graciliflorus, DC.

A glabrous herb. Stems 2-6 ft. high. erect, flexuose, sometimes angled and grooved. Leaves 4-6 by 2-4 in., stalked, pinnately divided into 6-8 pair of oblong, sharp-pointed, coarsely-toothed segments; stalk without lobes at the base; uppermost leaves narrow or linear, stalkless. Heads many, $\frac{1}{3}$ in. long, often drooping, narrowly cylindric, 5-8-flowered, in small clusters forming corymbs. Bracts surrounding the heads 5-7, linear, blunt, hairless. Outer flowers 2-5,

inconspicuous. Ligules deeply toothed. Fruit (achene) $\frac{1}{10}$ in. long, ribbed, hairless, all with a white pappus.

Flowers.—August, September.

Locality.—Temperate regions.

Distribution.—From Kashmir to Bhutan, 8,000-13,000 ft.

Senecio Levingii, C. B. Clarke. Levinge's Ragwort.

A tall, hairless, leafy herb, 2-3 ft. high. Leaves 4-7 in. across the angles, triangular, angles long-pointed, toothed, membranous, suddenly narrowed into a broad, short, wedge-shaped stalk. Flower-heads $\frac{1}{2}$ in., 5-flowered, stalkless or stalked, in axillary or terminal panicled racemes. Bracts surrounding the heads 5, narrow-linear, sharp-pointed, hairless. Ligules none. Fruit (achene) hairless. Pappus white, much shorter than the corolla.

Locality.—Sonamarg.

Distribution.—Temperate Kashmir, 8,000-10,000 ft.

Senecio chenopodifolius, DC.

A herb, slightly hairy above. Stem 2-4 ft. high, stout, soft, round, branched, naked below. Leaves 3-5 in. long and often as broad, triangular-heart-shaped or obscurely 3-lobed, long-pointed, irregularly sinuate-toothed, somewhat bluish-green below; stalk slender, with 2 broad lobes at the base. Heads $\frac{1}{4}$ in. long, numerous, 3-flowered, forming panicled racemes, short-stalked, drooping. Bracts surrounding the heads 3-5, $\frac{1}{10}$ in. long, oblong, slightly hairy, much shorter than the corollas. Ligules none. Fruit (achene) hairless, shorter than the brown pappus.

Locality.—Temperate regions, 7,000 ft.

Distribution.—W. and C. Himalaya, from Kashmir to Nepal.

Senecio Kunthianus, Wall.

Stem stout, often glandular, hairless or slightly hairy, leafy, simple or branched above. Leaves $1\frac{1}{2}$-3 by $\frac{1}{2}$-1 in., short-stalked, egg-shaped, or elliptic-lance-shaped, sharp-pointed, coarsely toothed, white-hairy beneath, hairless above. Flower-heads $\frac{1}{3}$ in. long, many-flowered, stalked, in broad corymbs. Bracts surrounding the heads 5-8, narrow, sharp-pointed. Ligules 5-7. Fruit (achene) $\frac{1}{8}$ in. long, slightly hairy. Pappus white, as long as the corolla of the inner flowers.

Locality.—Temperate and alpine region, 10,000-14,000 ft.

Distribution.—Himalaya, from Kashmir to Sikkim (12,000 ft.)

Plate 32

CARDUUS, Linn. The Thistle.

I. Bracts linear *C. acanthoides.*
II. Bracts lance-shaped. Flower-heads ¾-1½ in. diameter *C. nutans.*
III. Bracts with a long spreading or bent back spine. Flower-heads 2-3 in. diameter... *C. Thomsoni.*

Fig. 1. Carduus acanthoides, Linn.

A green plant. Stem slender, flexuous, branching. Leaves hairless or slightly hairy on the nerves of the lower surface, pinnately divided into egg-shaped, triangularly lobed, thinly spinous segments. Heads almost round, solitary. Flowers purple. Involucre almost hairless; bracts linear, somewhat broader at the base, erect-spreading, not as long as the flowers.

Flowers.—June to September.

Locality.—Gulmarg, open hill-sides, above 7,000 ft., common.

Distribution.—All over Europe from Scandinavia to Russia and the Caucasus, Kashmir.

Fig. 2. Carduus nutans, Linn. Musk Thistle, Queen Ann's Thrissel, Buck, Scotch Thistle.

An erect, robust, rough, biennial herb. Stem 1-4 ft., high, grooved, with wavy wings, spinous, cottony, usually simple. Leaves 6-12 in. long, oblong, once or twice pinnately cut, waved, spinous, running down the stem, hairy, with woolly veins below. Heads ¾-1½ in. diameter, purple or crimson, egg-shaped or globose, solitary or clustered, drooping. Bracts surrounding the heads many, lance-shaped, with a rigid point, outer ones turned back. Corolla-tube long, deeply 5-lobed. Fruit (achene) pale brown, hairless, bluntly 4-angled. Pappus copious, long, rough, united at the base into a ring, soon falling off.

Flowers.—June to September.

Distribution.—Temperate and subalpine W. Himalaya, 6,000-13,000 ft., N. Asia, westward to N. Africa and W. Europe.

Carduus Thomsoni, Hook. f. Thomson's Thistle.

A short, very robust annual, cottony or cobwebby above. Stem 12-18 in. high, leafy, simple, strongly ribbed. Leaves 6-8 in. long, linear-oblong or lance-shaped, with 2 lobes at the base, more or less pinnatifidly lobed, strongly spinous, leathery,



FIGS.—1, *Carduus acanthoides*, Linn.; 2, *Carduus nutans*, Linn.; 3, *Saussurea taraxicifolia*, Wall.; 4, *Saussurea Atkinsoni*, Clarke; 5, *Saussurea Atkinsoni*, Clarke.

shining, lowest leaves narrowed at the base, upper ones dilated. Heads 2-3 in. diameter, few, clustered or in corymbs, inclined, densely woolly. Bracts surrounding the heads 1 in. long, with a long strong spreading or bent back spine. Fruit (achene) almost ¼ in. long, hairless. Pappus hairs stiff, very unequal, reaching up to 1¼ in.

Locality.—Ladakh, 12,000-13,000 ft.

Distribution.—Apparently endemic in Kashmir.

SAUSSUREA, DC. The Saw-Wort.

The following key gives also the species of *Saussurea* on Plate 33. The first seven species of the key will be described under Plate 32, the rest under Plate 33. Under each Plate the species figured will be described first, and the rest will follow in alphabetical order.

A. Flower-heads not crowded on a flat, hollow, dilated top of the stem.
- I. Stem absent. Head solitary (Plate 32, figs. 4 and 5) *S. Atkinsoni.*
- II. Stem simple, leafy. Heads more or less enclosed in the inflated membranous uppermost leaves.
 - 1. Flower-head solitary *S. bracteata.*
 - 2. Flower-heads 2-6 *S. obvallata.*
 - 3. Flower-heads numerous ... *S. Schultzii.*
- III. Stem simple. Heads solitary, rarely 2-3 on a single stem or leafy stalk 1-6 in. high. Leaves basal and on the stem.
 - 1. Leaves pinnatifid, white beneath. Heads solitary.
 - *a.* Achenes hairless. Pappus pale brown,
 - i. Pappus ½ in. long (Plate 32, fig. 3) *S. taraxicifolia.*
 - ii. Pappus more than ½ in. long *S. Falconeri.*
 - *b.* Achenes covered with sharp points *S. Kunthiana.*
 - 2. Leaves entire or nearly so, villous or woolly beneath.
 - *a.* Achenes ¼ in. long (Plate 33, fig. 3) *S. Roylei.*
 - *b.* Achenes not more than ⅛ in. long.
 - i. Anther-tails fringed ... *S. graminifolia.*
 - ii. Anther-tails short, woolly *S. glanduligera.*

IV. Stem ½-3 ft., simple. Heads small. Only stem-leaves present. Outer pappus-bristles present.
1. Stem 1-3 ft. high (Plate 33, fig. 2) *S. Candolleana.*
2. Stem 4-6 in. high.
a. Pappus brown *S. Clarkei.*
b. Pappus white, except towards the base *S. elliptica.*

V. Stem tall, simple below, branched above. Leaves on the stem, or basal and on the stem. Outer pappus-bristles absent.
1. Pappus white.
a. Stem 2-5 ft. high *S. candicans.*
b. Stem 6-10 ft. *S. albescens.*
2. Pappus brown.
a. Pappus ⅓ in. long *S. hypoleuca.*
b. Pappus more than ½ in. long *S. Jacea.*

VI. Stem 6-7 ft. high, simple. Basal and stem-leaves. Outer pappus-bristles feathery (Plate 33, fig. 1) *S. Lappa.*

B. Flower-heads crowded on the flat, hollow, dilated top of the stem (Plate 33, fig. 4) *S. sorocephala.*

Fig. 3. Saussurea taraxicifolia, Wall.

Stems absent or 1-6 in. high, hairless or cottony, base covered with the black withered remains of old leaf-stalks. Leaves mostly basal, spreading, short-stalked, 4-8 by ½-1 in., linear, pinnatifid; segments triangular, sharp-pointed, all pointing downwards like the lobes of a dandelion leaf, upper surface green, hairless, lower white-hairy. Flower-heads solitary, ½-1 in. diameter, hairless or sparsely cottony. Bracts surrounding the heads lance-shaped, not spine-tipped. Flowers dark purple, corolla up to ½ in. long, anther-tails short-woolly. Fruit (achene) hairless. Pappus pale brown, ½ in. long, outer pappus-hairs few, rough.

Flowers.—July.

Locality.—Aporwat above Gulmarg, open grassy hill-side, above 10,000 ft., common; Rupshu, 16,000 ft.

Distribution.—Alpine Himalaya, from Kashmir to Sikkim, 10,000-16,000 ft.

Figs. 4 and 5. Saussurea Atkinsoni, C. B. Clarke. Atkinson's Saw-wort.

A stemless herb. Rootstock undivided. Leaves 2½-4 by 1½-3 in., spreading flat on the ground, 3-5, stalked or stalkless, broadly inversely egg-shaped or elliptic, toothed, membranous. Flower-heads stalkless, solitary, ¾-1 in. long. Bracts surrounding the heads variable, egg-lance-shaped, erect or bent back, hairless or margins hairy, inner bracts linear-oblong. membranous. Corolla up to ½ in. long. Anther-cells shortly fringed. Pappus ½ in. long, brown, outer pappus-bristles few, rough.

Flowers.—August, September.

Locality.—Aporwat above Gulmarg, open grassy hill-sides, above 10,000 ft., common; Gangabal.

Distribution.—W. Himalaya, from Kashmir to Garhwal, 10,000-13,000 ft.

Saussurea bracteata, Dcne.

A dwarf, slightly hairy herb. Stem 3-6 in. high, stout. Leaves linear-lance-shaped or narrowly elliptic, sharp-pointed, coarsely toothed; lower ones tapering into a very short stalk; upper ones stalkless; floral leaves boat-shaped, membranous, coloured, partially enclosing the large, stalkless, somewhat silky head. Bracts surrounding the head blackish, lance-shaped, long-pointed. Pappus ½ in. long, white, outer bristles rough.

Locality.—Ladakh.

Distribution.—Alpine W. Himalaya, from Kashmir to Kumaon and N. of Kumaon, 14,000-18,000 ft.

Saussurea Falconeri, Hook. f. Falconer's Saw-wort.

Stock stout or slender, sometimes thickly covered with the black shining remains of the old leaf-stalks. Stem very stout, short or long, 1-6 in. high, cottony or woolly, sparingly leafy. Leaves 3-6 by ¼-½ in., stalked, linear, cottony above and more so beneath, pinnately cut or toothed, lobes or teeth spreading or bent back, triangular, sharp-pointed. Heads 1-2 in. diameter. Bracts surrounding the heads linear-lance-shaped, cottony, pale, erect. Corolla 1¼ in. long. Anther-tails short-woolly. Pappus more than ½ in., pale brown, double or single, sometimes the outer pappus consisting of feathery bristles, sometimes of rough bristles or absent. Fruit (achene) smooth.

Resembles *S. taraxicifolia*, but can be distinguished by the stout stem and woolly habit.

Locality.—Karakoram.

Distribution.—Alpine Kashmir, 13,000-14,500 ft.

Saussurea Kunthiana, C. B. Clarke. Kunth's Saw-wort.

A dwarf, stemless herb. Leaves stalked, spreading, linear, pinnately cut, hairless or slightly hairy above, white-hairy beneath, lobes quadrate, half-circular or oblong, entire or lobed and toothed. Flower-head solitary, stalkless, 1-1½ in. diameter. Bracts surrounding the heads lance-shaped, inner often with jagged tips. Anther-tails short, woolly. Fruit (achene) covered with sharp points. Outer pappus-hairs few, rough.

Locality.—Alpine regions, 14,000-16,000 ft.

Distribution.—Alpine Himalaya, from Kashmir to Sikkim.

Saussurea obvallata, Wall.

Stem stout, simple, 6-18 in., slightly hairy or almost hairless, ended by the bent-in bladdery, veined, translucent leaves which form a pale head 3-6 in. diameter, enclosing 2-6 flower-heads. Leaves 4-8 in., hairless, blunt, toothed, lower ones stalked, inversely egg-shaped, stem-leaves stalkless, half-stem-clasping, oblong, concave. Flower-heads stalkless or short-stalked, hairless, ½-¾ in. diameter, hemispheric. Bracts surrounding the heads lance-shaped, tip and often the margin black. Corolla ¼ in. long. Anther-tails short, fringed. Pappus brown, ⅓ in. long, outer pappus-bristles rough or absent. Fruit (achene) inversely egg-shaped, ribbed, hairless.

Locality.—Subalpine and alpine region.

Distribution.—Himalaya, from Kashmir to Sikkim, 10,000-15,000 ft., Altai Mountains.

Saussurea Schultzii, Hook. f. Schultz's Saw-wort.

A hairless or slightly hairy herb. Stem stout, simple, 6-16 in., often coloured. Root very stout, crown covered with the bent back remains of the old leaf-stalks. Leaves 3-5 by ½-1½ in., leathery, toothed; basal ones narrowed into a stout stalk, linear-oblong, sharp-pointed, midrib very thick; stem-leaves half-stem-clasping, long-pointed; floral leaves short, boat-shaped, 1-2 in. long, often as broad and rosy, partially enclosing the flower-heads. Heads ½-1 in. diameter, many, crowded, very hairy. Bracts surrounding the heads lance-shaped, long-pointed, blackish. Corolla ½ in. long. Anther-tails short, woolly. Pappus pale brown, outer bristles rough.

Locality.—Karakoram Mountains, 14,000-17,000 ft.

Distribution.—Alpine W. Himalaya, apparently endemic in Kashmir.

Plate 33

Fig. 1. Saussurea Lappa, C. B. Clarke. The Kuth Plant. Coventry pl. XXVI.

A tall, robust, perennial herb. Stem erect, 4-7 ft. high, simple. Leaves membranous, irregularly toothed; basal ones very large, 2-4 ft. long, triangular, with a long lobately winged stalk, end-lobe often 1 ft. diameter. Stem-leaves smaller, stalked or stalkless, with 2 half-stem-clasping lobes at the base. Flower-heads stalkless, hard, rounded, 1-1½ in. diameter, 2-5 forming axillary and terminal clusters. Bracts surrounding the heads many, egg-lance-shaped, long-pointed, rigid, bent back, hairless. Corolla ¾ in. long, tubular, dark blue-purple or almost black. Stamens free. Anther-tails fringed. Pappus-hairs ⅔ in. long, brown, all feathery. Fruit (achene) up to ⅓ in. long, compressed, curved, tip narrowed, with 1 rib on each face, top contracted, cupped.

Flowers.—August, September.

Locality.—Aporwat above Gulmarg, amongst grass and scrub on open hill-sides, above 10,000 ft., common; Sonamarg; Jhelum Valley; Zanskar, Kishenganga Valley; Kishtwar.

Distribution.—Apparently endemic in Kashmir, 8,000-12,000 ft.

Fig. 2. Saussurea Candolleana, Wall. De Candolle's Saw-wort.

Stem 1-3 ft. stout, simple, leafy, deeply grooved. Leaves 3-6 by 1-3½ in. all on the stem, oblong or egg-lance-shaped, sharp, or long-pointed, finely toothed, stalkless, nerveless, hairless above, usually cottony or cobwebby below, base rounded or abruptly narrowed below the middle. Heads ½-¾ in. diameter, short stalked, in dense corymbs or clusters. Bracts surrounding the heads egg-shaped, blunt or sharp-pointed, hairless or silky. Corolla ¼-⅓ in. Anther-tails fringed. Pappus ⅓ in. long, pale brown, outer pappus-bristles short, rough. Fruit (achene) narrow, 4-5-angled, smooth.

Flowers.—July to September.

Locality.—Aporwat above Gulmarg, amongst scrub and long grass on open hill-sides, above 9,000 ft., common.

Distribution.—Temperate Himalaya, from Kashmir (8,000-10,000 ft.) to Sikkim (11,000-13,000 ft.); Soongaria.

Fig. 3. Saussurea Roylei, C. B. Clarke. Royle's Saw-wort.

Stem 6-18 in., stout, thickened under the head, almost hairless or cottony. Leaves very variable, from white-hairy to almost hairless beneath. Basal leaves 3-10 in., stalked,

erect, elongate-lance-shaped, long-pointed, entire or sinuate or pinnately cut towards the base. Stem-leaves few, stalkless, half-stem-clasping. Flower-heads 1½-2 in. diameter, hairy. Bracts surrounding the heads lance-shaped, long, straight. Corolla about ½ in. long. Anther-tails woolly. Fruit (achene) ¼ in. long and more, narrow, smooth. Pappus ½ in. long, pale brown, outer pappus bristles rough.

Flowers.—June, July.

Locality.—Temperate and subalpine regions; Lolgal Sar.

Distribution.—W. Himalaya, from Kashmir to Kunawer, 11,000-14,000 ft.

Fig. 4. Saussurea sorocephala, Hook. f. & T.

A dwarf, densely tufted herb. Stem none or very short, thickly woolly or cottony, flowering stem, when produced, hollow at the top and much dilated under the flower-heads. Leaves ½-1 in., inversely egg-lance-shaped, entire or obscurely toothed. Heads not hidden by floral leaves, very many, ½-1 in. long, cylindric. Bracts surrounding the heads lance-shaped, silky or hairless. Pappus pale brown or dull blue, outer pappus-hairs rough, many or few, or none. Fruit (achene) narrow, 5-angled.

Flowers.—July.

Locality.—Above Zoji La.

Distribution.—Alpine W. Himalaya, from Kashmir to Lahul and to the north of Kumaon.

Saussurea albescens, Hook. f. & T.

Stem 6-10 ft. high, simple, erect, slender. Leaves variable, 4-12 in. long, sharp- or long-pointed, entire or sinuate-lobed or almost pinnately cut, hairless, rough or cobwebby above, hairy beneath, with slender branching nerves, lower leaves oblong, stalked, upper ones stalkless, egg-shaped or linear or oblong-egg-shaped. Heads narrow, ½-⅔ in. long, stalked, in flat-topped corymbs. Bracts surrounding the heads, erect, hairless, rarely cottony, rigid, purplish, the outer ones egg-shaped, sharp-pointed, the inner lance-shaped. Corolla ½ in. long, pale red. Anther-cells fringed. Pappus white, ⅓-½ in. long. Outer pappus absent. Fruit (achene) up to ⅛ in. long, top cupped.

Flowers.—August, September.

Locality.—Temperate region.

Distribution.—W. and C. Himalaya, from Kashmir to Nepal, 6,000-10,000 ft.

Saussurea candicans, C. B. Clarke.

Stems 1-5 ft. high, erect, cottony. Basal leaves oblong or inversely egg-shaped, narrowed into a short stalk, $\frac{1}{6}$ by $\frac{1}{2}$-$1\frac{1}{2}$ in., sometimes 18 by 5 in., entire or sinuate, pinnately lobed near the base, rough above, white-hairy below. Stem-leaves usually few, stalkless, lance-shaped, usually smaller than the basal leaves. Heads $\frac{3}{4}$-$1\frac{1}{2}$ in. diameter, long-stalked, solitary or in corymbs. Bracts surrounding the heads lance-shaped, long-pointed, rigid, hairy. Corolla pale red, up to $\frac{1}{2}$ in. long. Anther-tails fringed. Pappus-hairs slender, white, as long as the corolla. Outer pappus none. Fruit (achene) $\frac{1}{5}$ in. long, 5-angled, pointed all over, top cupular.

Flowers.—April, May.

Locality.—Subtropical and temperate regions.

Distribution.—Afghanistan, Salt-Range, Kashmir to Bhutan, 2,000-7,000 ft.

Saussurea Clarkei, Hook. f. Clarke's Saw-wort.

Stem 4-6 in. high, stout, simple, slightly hairy. Leaves 4-5 in. long, all on the stem, inversely egg-shaped, sharp-pointed, stalkless or narrowed into a winged stalk, sharply toothed, slightly hairy above, cottony or almost hairless beneath. Heads $\frac{1}{3}$ in. diameter forming a dense corymb. Bracts surrounding the heads hairless or cottony, outer ones egg-shaped, sharp-pointed, inner ones lance-shaped, long-pointed. Pappus brown.

Locality.—Alpine region.

Distribution.—Kashmir, 13,000-14,000 ft.

Saussurea elliptica, Hook. f.

Stem slender, 4-6 in. high, cottony. Leaves 3-4 in. long, long-stalked, elliptic-oblong or lance-shaped, sharp-pointed, toothed, narrowed into a slender cottony stalk, cottony on both surfaces. Flower-heads $\frac{1}{3}$ in. diameter in a small loose corymb. Bracts surrounding the heads lance-shaped, long-pointed, hairy. Corolla nearly $\frac{1}{2}$ in long. Anther-tails fringed, hardly woolly. Pappus white, except towards the base, outer pappus-bristles numerous, rough.

Locality.—Karakoram, 14,000 ft.

Distribution. — Alpine Kashmir, apparently not found anywhere else.

Saussurea glanduligera, Schultz & Bip.

Stem 4-8 in., glandular hairy. Leaves 2-4 in. and longer, pale green, glandular hairy on both surfaces, narrowly linear-lance-shaped, irregularly sinuate-toothed, stalk dilated into a

narrow hairless sheath with often woolly base and margins, sheath of stalk of basal leaves pale chestnut brown. Flower-heads solitary, 1-1½ in. Bracts surrounding the heads lance-shaped, erect, pale, more or less hairy. Corolla almost ½ in. long. Anther-tails short, woolly. Fruit (achene) ⅛ in. long, 4-angled, slightly rough, pale, cupped at the top.

Locality.—Ladakh, 14,000-16,000 ft.

Distribution.—Alpine Kashmir, Lahul.

Saussurea graminifolia, Wall.

Stem 6-10 in. high, stout, thickened upwards, leafy, densely woolly, shining, rarely almost hairless. Leaves 2-5 by $\frac{1}{10}$-⅛ in., very slender, narrowly linear from a dilated shining base, hairy beneath, margins entire, bent back; stalks sheathing, 1 in., hairless except on the margins. Flower-head solitary, 1-1½ in, diameter, densely hairy. Bracts surrounding the head narrow-lance-shaped. Fruit (achene) short, smooth. Pappus pale brown, outer pappus-bristles short, rough.

Locality.—Salt Marshes, Ladakh and below the Ladakh Pass, 15,000-16,000 ft.

Distribution. — Alpine W. Himalaya, from Kashmir to Kumaon, 12,000-16,000 ft.

Saussurea hypoleuca, Spreng.

Stem 2-5 ft. high, erect, simple or branched above, leafy, hairy or hairless. Basal leaves narrow, 6-10 in. long, pinnately cut, lateral lobes pointing downwards, end-lobe much larger, oblong. Stem-leaves 3-8 in. long, pinnately lobed, lateral lobes 2-4 pairs, oblong, less than 1 in. long, end-lobe triangular, sharp-pointed, 2-4 by 1-3 in., toothed or sinuated; rough above, white-hairy beneath. Flower-heads 1½-2 in. diameter, solitary, globose, nodding, long-stalked, many-flowered. Bracts surrounding the heads lance-shaped, long-pointed, purple. Corolla dark purple, ½ in. long, limb the length of the tube. Anther-tails long, entire or split near the tip. Fruit (achene) ⅛ in long, almost cubical, 4-angled, tubercled, black, tip with a toothed cup. Pappus ½ in. long, brown, single.

Flowers.—July, September.

Locality.—Temperate regions.

Distribution. — Temperate Himalaya, from Kashmir to Sikkim, 7,000-13,000 ft.

Saussurea Jacea, C. B. Clarke.

Stem 1-4 ft., rigid, simple below, branched above, slightly hairy, not grooved; branches very leafy. Leaves 3-4 by 1½-2½ in., uniform, stalkless, half-stem-clasping, egg-shaped or



FIGS.—1, *Saussurea Lappa*, Clarke; 2, *Saussurea Candolleana*, Wall.; 3, *Saussurea Roylei*, Clarke; 4, *Saussurea sorocephala*, Hook. f. & T.

oblong, blunt or sharp-pointed, entire, rough on both sides. Flower-heads ½-⅔ in. diameter, stalked, solitary or in corymbs. Bracts surrounding the flower-heads few, rigid, broad, outer ones egg-shaped, blunt or sharp-pointed, inner ones lance-shaped. Corolla ⅔ in. long. Anther-tails awl-shaped, entire. Fruit (achene) smooth, shining, top truncate. Pappus more than ½ in. long, double hairs, all feathery, brown.

Locality.—Temperate and alpine regions.

Distribution.—W. Himalaya, from Kashmir to Kunawer, 9,000-15,000 ft.

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